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THE MEDICAL JOURNAL OF AUSTRALIA

VOL. II.—9TH YEAR. SYDNEY: SATURDAY, JULY 1, 1922. No. 1.

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X-RAY THERAPY.[1]

WITH SPECIAL REFERENCE TO TREATMENT OF CANCER.

BY E. H. MOLESWORTH, M.B., CH.M. (SYDNEY),
Honorary Physician for Diseases of the Skin, Royal Prince Alfred Hospital, Sydney.

I FEEL that I must apologize for bringing before you a matter involving a lot of technicalities, which I have simplified as far as possible, but I can only advance as an excuse the urgency of the necessity for consideration and effort in this highly important, if much neglected, branch of medical science.

I have been stimulated to write this paper by certain recent and remarkable developments in X-ray therapy originating from the work carried out in Professor Dessauer's physical laboratory in Frankfort.

There is no treatment of approved usefulness in medicine understood so little and applied by such a small minority as radio-therapy.

For many years, almost up to the discovery of radium, the use of X-rays was very desultory and methods were very vague, until the first more or less satisfactory means of measurement of X-rays of a certain rather low degree of penetration was discovered by Sabouraud.

Even before then, however, certain forms of malignant growth, such as superficial rodent tumours, etc., were commonly treated and cured by means of X-rays, but, instead of giving full doses, as is almost invariably done nowadays, fractional dosage, generally measured by very vague standards and repeated at frequent intervals, was the commonest method.

Moreover, a really soft ray, such as is now used only in radiography, was used and this seemed quite rational in view of the superficial character of the tumours treated.

But it was found that rodent tumours involving bone or cartilage were unmanageable and more malignant tumours, such as breast and uterine cancers and squamous epitheliomata arising in mucous membranes, were for practical purposes intractable; the treatment of such conditions, except as a palliative in inoperable cases, was recognized as unjustifiable.

Röntgen Rays and Gamma Rays.

Just about this time, I think about 1909-1910, radium came on the scene and was tried out by many to a much greater extent than X-rays. The massive dose method, which was then just coming into use in X-ray therapy, was adopted by the radium exponents, who also utilized another device

[1] Read at a meeting of the New South Wales Branch of the British Medical Association on May 26, 1922.

to obtain deeper and more uniform penetration, *viz.*, filtering by means of sheets of aluminium. They thus eliminated the very soft rays which were absorbed in and exerted an irritating action on the surface epithelium, thus limiting the dose tolerated by normal tissues without ever reaching the tumour cells. These filtering methods were improved and heavier and more absorptive metals used, such as copper, lead and silver, so that the radium therapists came to use a very much more penetrating and homogeneous bundle of rays than was possible to obtain by any X-ray plant at that time.

In this connexion it must be understood that in physics γ rays of radium and X-rays are universally regarded as synonymous, variations in penetrative power dependent upon wave-length being regarded as differences of quality and not of nature.

Another good point which radium therapists adopted and brought to a very satisfactory development was the art of cross-firing, that is to say, sending into the mass of a growth beams of rays intersecting in the mass of the tumour, but each affecting only a fraction of the epithelial surface. By this means the effect at a depth below the surface was multiplied once more, thus enhancing the benefit achieved by filtering.

Thus the use of filtration and cross-fire, together with the use of massive dosage, were some of the benefits attributable to the efforts of the radium therapists. The better results obtained by these methods gave radium a great boom, which was justified to a great extent, but which, like so many such waves, was carried to excess by some enthusiasts, most of whom were quite ignorant of what had been done and could be done by means of X-rays. These they also mistakenly regarded as being of quite different nature, instead of quality, from the γ rays of radium.

While radium gained a great reputation, it must be recognized that it was by methods and not by the inherent nature of the rays.

But the stimulus given by the success of radium was soon productive of improved methods in X-ray therapy and a much more penetrating ray was used by increasing the spark gap, *i.e.*, the voltage across the tube. By the design and use of better tubes, a more homogeneous bundle of rays was obtained by heavier and heavier filtration and cross-fire methods were adopted, so that results comparable to those obtained by the use of radium were soon available.

Not only in the application of the treatment, but also in the scope of the medication, are X-ray therapists indebted to the users of radium. Under the idea that they were dealing with a different medicament, conditions hitherto untouched or neglected by the X-ray men were tackled by the radium exponents. Not to speak of the various more virulently malignant growths, where the results of the use of radium were really very patchy, certain brilliant successes were obtained by radium in the treatment of vascular nævi, which were hailed as proving that the rays of radium were different to those of an X-ray tube.

But these nævi were then attacked by X-rays and found to be just as amenable to them as to the rays of radium.

After this divagation I shall return to the subject of malignant disease, which was enthusiastically tackled by the exponents of radium and quite rightly too. Although some apparently brilliant results were obtained, it soon became evident that radium was not going to prove of any great benefit to humanity in providing a cure for this, one of our greatest plagues.

In fact it must be admitted that misguided enthusiasts brought the method into considerable disrepute and caused a great deal of opposition from more rational and more conservative sections of the medical profession.

Susceptibility of Cells to X-Rays.

Yet it became obvious that the rays of radium and it was also by this time obvious that the rays of an X-ray tube could kill cells of very malignant tumours, but the difficulty was that all the cells could not be killed.

It is important to observe here that it was definitely shown that diminution in the mass of the tumour could be obtained by either means and that the tumour cells showed a greater sensibility to the radium or X-rays than did normal cells, such as the epithelium covering them. Efforts to kill them all almost always, though not quite invariably, failed. It was also shown that the cells of certain tumours proved more susceptible than those of other tumours, for example, lymphosarcoma, the terror of the surgeon, was highly susceptible and quite a number of cures are claimed. It was shown and is easily demonstrable that scirrhus of the breast, though less susceptible than lymphosarcoma, is more manageable than squamous epithelioma arising from mucous membranes.

It was shown and is every month demonstrated by every radio-therapist that squamous epithelioma arising from skin is almost invariably very much more amenable than squamous epithelioma arising from mucous membranes, especially in the mouth.

These and many other valuable points were discovered through the daring of the radium therapists in invading the realm of malignant disease.

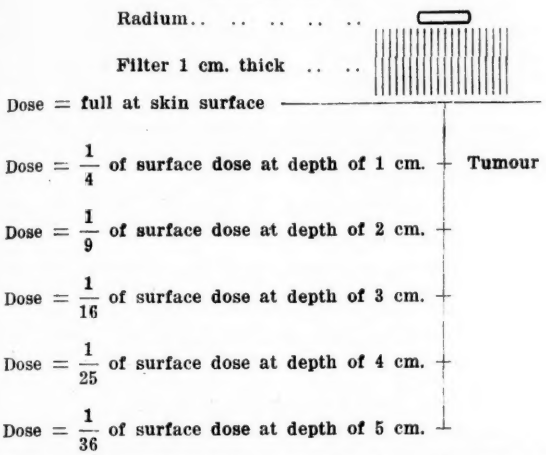
These results were obtained by both X-ray and radium users and the credit is to be distributed, although the primary stimulus came from the apparent success of radium in some cases.

But as I have already stated, it was found that a shout had been raised before we were out of the wood. Patients apparently cured relapsed, while good results were not obtained as a general rule with growths of a similar nature. In spite of increased filtration, multiplied cross-firing and even destructive dosage, the claim of being a cancer cure had to be abandoned.

The reasons for this are now obvious, for, while radium has several advantages, such as ease of manipulation, easy calculation of dose and the production of a fair bundle of intensely penetrating rays under heavy filtration, it labours under one impossible handicap, *viz.*, the necessity for close approximation to the growth to be treated and therefore great loss of therapeutic effect in the depth by

diffusion or spread. The rays fan out through 180° if the radium is in contact with the skin and, even if separated by a centimetre of filter, it is not much better.

DIAGRAM No. 1.


Radium.. .. ..
Filter 1 cm. thick .. ..
Dose = full at skin surface
Dose = 1/4 of surface dose at depth of 1 cm.
Tumour
Dose = 1/9 of surface dose at depth of 2 cm.
Dose = 1/16 of surface dose at depth of 3 cm.
Dose = 1/25 of surface dose at depth of 4 cm.
Dose = 1/36 of surface dose at depth of 5 cm.

Radium one centimetre distance from skin. Tumour one centimetre below surface. (Law of Inverse Squares.)

At a depth of five centimetres—a very small distance—beneath the surface irradiated, a tumour would need thirty-six ports of entry to enable a truly beneficial effect to be procured.

For a growth at a depth of nine centimetres, one hundred ports of entry are required and very few malignant growths are accessible by one hundred routes.

Of course, with a wider applicator this is not quite true, but it is approximately true of all radium applicators of practicable dimensions. It certainly means that, even if a tube of radium be buried in the middle of a tumour ten centimetres in diameter and a destructive dose, say, three times the dose regarded as a normal dose, be administered, there will be received at the periphery, where the tumour cells are most active and vigorous, only one-twelfth of a normal dose. Now this is more stimulating than destructive to cancer cells.

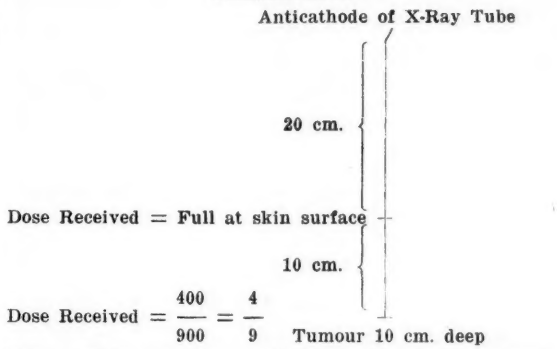
If the tumour obligingly projects so that twelve ports of entry all over the surface can be utilized or the whole surface covered with a radium impregnated *toile* even a normal dose might be achieved.

But radium, no matter in how large a quantity, placed in an *os uteri* will still leave malignant cells at five centimetres, nay, at one centimetre, from the radium affected by less than the minimum therapeutic dose applicable to malignant cells, even if a double or even a treble dose be administered at the point of contact of the radium applicator.

Now let us see what happens when X-rays are used.

A very common distance between the focal point on the anode or target of an X-ray tube and the nearest point of the surface of the patient is twenty centimetres.

DIAGRAM No. 2.

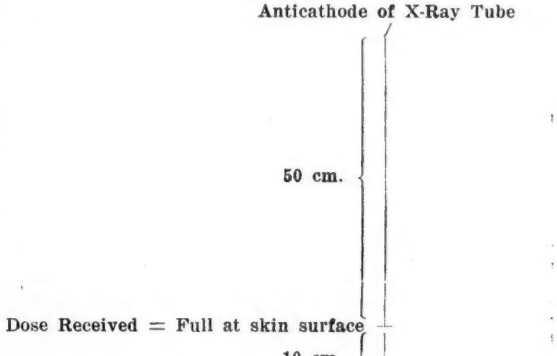


X-Ray Tube at twenty centimetres skin focus distance. (Law of Inverse Squares.)

Compare this with one-one hundred and twenty-first of the skin dose in the case of radium.

Now, by placing the X-ray tube at a still greater distance, say, fifty centimetres, which is quite possible and is done frequently and, indeed, is doubled nowadays by some operators, the result will be as is shown in Diagram No. 3.

DIAGRAM No. 3.


Anticathode of X-Ray Tube
50 cm.
Dose Received = Full at skin surface
10 cm.
Dose Received = 2500/3600 = more than two-thirds of skin dose
Tumour at 10 cm. depth

X-Ray Tube at fifty centimetres skin focus distance. (Law of Inverse Squares.)

This is from a single port of entry, so that it is quite easy to get more than a full dose at any point by two cross-fires, provided we take into account only this, which is called loss by diffusion (fanning out) to which all rays originating from an approximate point are subject (law of inverse squares).

But another very important factor is to be taken into account, *viz.*, loss by absorption. The above diagrams suppose that a perfectly transparent medium for the rays exists between the surface and through the tumour, as, of course, it is not.

Loss by absorption is calculated, however, fairly easily, since water and tissue are approximately equal in their capacity to absorb X-rays or γ rays. The amount of absorption is also dependent upon the hardness of the rays. Rays of most diverse penetrating capacity come off from any specimen of

radium and any X-ray tube, but in the latter can be manipulated to give a greater proportion of more highly pentrating rays, by increasing the voltage of the exciting current and if the peak voltage be selected, as by a rectifier of very small arc, this bundle can be obtained of a comparatively homogeneous quality.

Now, in this respect, up to quite recently radium had a great advantage over X-rays. The proportion and amount of available ultra-penetrating rays which would suffer absorption to a minimum extent in traversing the ten centimetres of tissue referred to, was much greater than in the case of X-rays.

But, as I have before mentioned, the stimulus given to X-ray invention by the radium therapy resulted in the production of the Coolidge tube, with an even output of more homogeneous rays and rays of a far greater capacity of penetration than had been dreamed possible of achievement by an X-ray tube.

Now a "super" Coolidge and "super" tubes of other makes have been evolved of a type which makes the balance if not even, at least of unimportant, value. At any rate, the disadvantage of a bundle of rays originating from an X-ray tube of this kind, on account of lesser penetrative capacity and consequent loss by absorption, is infinitesimal as compared with the disadvantages of radium on account of the loss by diffusion.

It may be objected that the radium can be placed fifty centimetres away from the skin; but think of the time of exposure or the cost of the metal! Let us suppose that a specimen of radium which at one centimetre distance will give a full dose on the skin under heavy filtration in one hour and that the quantity is twenty milligrammes (a ridiculous under-estimate) at £25 per milligramme (total, £500), the same quantity would take 2,500 hours or over one hundred days to deliver that dose at fifty centimetres distance. Or you would need 50,000 milligrammes or £1,250,000 worth of radium to do it in an hour, which is the time occupied by a modern X-ray tube in delivering the dose!

Radium will no doubt still serve as an adjuvant, but as such it is doomed to remain.

Roughly it may be said that with X-rays generated by a current of 250 kilo-volts, filtered through one-half to one millimetre of copper or zinc, delivered from a distance of fifty centimetres, there will remain between one-quarter and one-third of the surface dose after allowing for loss by diffusion and loss by absorption, to operate upon a tumour ten centimetres below the skin surface.[1] Thus it will be necessary only to use three or four ports of entry to bring the depth dose to the same or more than the surface dose.

Treatment of Skin Tumours.

My practice has been to use hard rays and filter moderately, even for superficial lesions. To this I attribute the successful treatment of superficial lesions, such as rodent ulcer, squamous epithelioma arising from the skin and even recurrent scirrhous nodules and similar growths. I have also been helped in the production of a comparatively homogeneous bundle of X-rays by the use of a rectifier which only picks up current at the peak of the wave at its highest voltage, the rectifier having only very short segments, neglecting the lower voltages from the base of the wave.

I have for the past year or more kept an X-ray ledger in which are entered accurate details of all cases treated by X-ray: the dosage, filtration, voltage employed, localization of the area irradiated and the size of the area irradiated.

It has occurred to me to utilize the record, which gave me an easy lead to all case cards, all of which can be hunted out of the cabinet.

It will be noted that only two methods of measurement are used, *viz.*, Sabouraud pastille and milliampère-minute calculations.

A pastille is not used on every occasion, but a mean of several readings is taken and that mean used in milliampère-minutes for subsequent treatments. I find that this method of taking a mean of several readings is very much more reliable than single readings, especially with a modern tube which can be relied upon for a uniform output.

It is also to be noticed that in delivering treatment to small areas I frequently transgress the normal dose and give a dose and a half, or even two doses, in a sitting to diseased areas only.

This practice is generally confined to areas one or two centimetres in diameter, but where an ulcerated surface, already denuded of epithelium, exists, there is no reason for stopping at a single dose. No harm is done by giving a dose and a half of hard filtered rays, even to an unulcerated rodent tumour or epithelioma, provided the area is not large, say, under three centimetres in diameter. In regard to ulcerated tumours, provided the surrounding healthy skin is shielded, it is justifiable and even desirable to give a double and some give even a treble dose, since it is the skin that is the sensitive tissue and that reacts unduly. If the base of the ulcer is composed of malignant cells, it is desirable to give the maximum dose consistent with the safety of the underlying healthy tissue, which is a very different story to the safety of the overlying skin, which must receive a greater dose than the underlying tumour and which must receive due respect.

A very satisfactory procedure is to cut a hole in a piece of lead the size of the ulcer or, if the latter is large, to surround the ulcer with a number of pieces of lead, or lead rubber, to deliver to the ulcer a full dose, then to remove the protection and to deliver to the ulcer and the surrounding tissues, as far as the growth can reasonably be suspected of penetrating, another but not more than a single erythema dose.

It is sometimes possible, but rarely necessary, to use cross-fire for rodent growths.

As a routine, then, it is hardly ever advisable to give more than a normal erythema dose to healthy skin surrounding the tumour, but possibly undermined by tumour cells, and quite permissible and even desirable to give more than an erythema dose to the rodent tumour itself, even if unulcerated, but more especially if ulcerated. If, however, an unulcerated rodent tumour is more than three centimetres in diameter (a very rare circumstance), it

[1] With two hundred kilo-volts, 0.5 millimetre copper filter and fifty centimetres skin focal distance the dose available is approximately 50%.

would probably be best to confine the dose to the normal.

Under this dosage small rodent tumours and epitheliomata arising from the skin rapidly wilt and the surface is soon covered with epithelium. In some a single sitting will produce apparent cure; in many two sittings, with a month's interval, may be required. Few will resist three and rarely is it necessary, except in extremely wide and deep rodent tumours, to give more than four.

But here a word of warning is opportune. Nearly all the ill-repute that has fallen to this line of treatment is due to apparent cure being mistaken for real cure and to the premature dismissal of the patient at this stage.

As a working rule it is advisable to give after apparent cure half as much irradiation as was required to bring about apparent cure. This I regard as highly important and, finding that nearly all the recurrences that have occurred in my practice are due to the mistaking by me or the patient of apparent for real cure, I now warn the patient that I will not undertake the treatment unless he quite understands and agrees to this procedure.

Another fault, both in the surgery and the radiotherapy of rodent growths, is that far too narrow an area is excised or treated and it is as well to excise or irradiate an area of apparently healthy skin, half the diameter of the ordinary rodent tumour, all round the lesion and to employ a method which will get rid of cells at a depth of at least two and preferably three times the apparent depth of the tumour.

The advantages of this form of treatment over radium are twofold:

(1) From the point of view of the patient:

(*a*) The delivery of the dose rarely takes more than ten minutes, often only two or three, while a radium exposure generally takes several hours or an hour at least. This saves a lot of time and inconvenience and even discomfort.

(*b*) It is much less expensive, the cost rarely exceeding ten guineas at reasonable fees, except for very large rodent tumours.

(*c*) It is equally or more satisfactory in the end, which is attained in as short or a shorter time.

(2) From the point of view of the practitioner:

(*a*) It is possible, owing to the shorter time of exposure, to deal efficiently with a much larger number of patients, with the expenditure of less time and less capital.

(*b*) It is possible to achieve an equally good result, especially in extensive growths, with a capital outlay of about £1,000 or less if rodent tumours only are to be dealt with, as compared with several times that amount to be invested in radium if any considerable surface is to be attacked or efficient filtration desired.

The disadvantages as compared with radium are:

(1) That radium is infinitely easier to apply. Once the erythema dose is ascertained for any given filter, the radium applicator can be applied for the time determined ever after, while each X-ray tube, even of modern type, has to be tested from time to time and even then the input of energy has to be carefully regulated, in milliampèrage (quantity) and voltage (pressure) to insure a similar output of radiation.

Very much more training, aptitude and experience are required to use X-rays efficiently than to use radium efficiently.

(2) Another disadvantage is that a severe crusting or even ulcerating burn can apparently be caused by radium without the patient regarding it as other than part of the game, while all are alive to the responsibility of the operator if a similar reaction be produced by means of an X-ray tube.

As compared with surgical measures, the advantages of X-ray treatment are all on the side of the patient.

(1) From the point of view of the patient:

(*a*) Efficient X-ray treatment will generally cost less than efficient surgical treatment.

(*b*) The natural prejudice of the patient against being cut upon is not shocked.

(*c*) Multiple lesions which would require wide excision and might be impossible to remove without disfiguring or crippling procedure, such, for example, as division of the facial nerve, can be dealt with efficiently by X-rays. Moreover, various pre-rodent keratoses, which so frequently in this country exist simultaneously with fully developed rodent tumours, can be cured at the same time, while efficient surgical treatment would probably mean stripping a large portion of the skin to get rid of them.

(*d*) Except in skilled hands, the surgical treatment of rodent tumour is in many cases extremely inefficient and skimpy in its performance or extremely disfiguring in its after effects, whereas an almost perfect result can be obtained by means of radio-therapy without disfigurement, except where an *ala nasi* or similar anatomical part has already been destroyed by the growth and this with a hardly appreciable scar, except where deep ulceration has existed in the growth.

The disadvantages of treatment of rodent tumours by X-ray therapy as compared with surgical measures are:

(1) On the part of the operator: he does not receive anything like the same remuneration for the time, skill and effort required as he would for surgical measures.

(2) On the part of the patient: surgical measures, if skilfully and widely performed, mean the completion of the treatment in a few days to a few weeks instead of in six weeks to three months.

And here it is opportune to point back to the advantages to the patient of using X-ray treatment which seem definitely to swing the favour of X-ray therapy. But it must be efficiently applied, just as surgical measures must be efficiently applied.

Summary of Cases of Rodent Ulcers.

Number of patients treated	89	
Total dosage administered	380 B	
Average dose per patient	4 B	
Number of patients cured	78	= 87%
Number of patients left after one or two exposures	6	= 7%
Number of resistant cases which had to be referred to the surgeon	4	= 5%
Left off treatment to return to Queensland	1	= 1%

The actual number of rodent ulcers in the above list was a good deal more, since a number of patients had multiple lesions. But the end results was complete disappearance in all cases marked cured. I also think that nearly all the patients who left after one or two exposures were cured, but I did not care to add them to the list of cures. The case of the man who left off treatment to return to Queensland is now again under treatment and doing well.

The following case report is given as exemplifying the results:

Mrs. G., aged sixty-five years, was referred to me by Dr. Margherita Freeman.

On March 15, 1921, there was a huge rodent growth on the right side of the nose and cheek, extending right up to and involving the lower lid. It was movable, but not freely so. It measured about six centimetres in diameter and was raised 0.5 to one centimetre above the level of the skin. It was ulcerated. The lesion had been present many years. Another rodent tumour was seen on the bridge of the nose and a third on the left *ala nasi*.

At the first exposure an erythema dose and a half was applied to the diseased areas, including an erythema dose to the surrounding skin.

On April 8, 1921, the dose was repeated.

On May 3, 1921, the dose was repeated. All the lesions were flat with the surface and all ulceration had healed, though some infiltration persisted at the site of main tumour.

Three more doses were delivered for safety and the patient, when last seen in December, 1921, was apparently quite well. Practically no trace was noticeable of the really formidable lesion. There was no deformity of the lid or nostril and hardly any noticeable scar remained.

Squamous Epithelioma of the Skin.

In dealing with squamous epithelioma arising from the skin, as distinct from the mucous membranes, a different problem presents itself. There is, however, not such a wide divergence as exists between the treatment of rodent tumour and that of squamous epithelioma arising from mucous membranes. The latter is highly intractable to ordinary X-rays in my experience, but may become amenable to rays of higher penetrative power and therefore greater selective action.

As a general rule, squamous epithelioma arising from the skin is amenable and, provided the glands are not involved and the growth not too large, can be safely attacked. In fact, I was surprised in the course of excising for pathological examination a large number of apparent rodent tumours for another purpose than that of this paper to find how often a small lesion, apparently rodent and certainly slow growing, turned out to be squamous epithelioma. I have no doubt that a considerable proportion of the small so-called rodent tumours mentioned previously were really squamous epithelioma.

But in any case most of these growths, even small, are noticeably, though not greatly, more resistant than rodent tumour, though this is certainly less marked if hard or penetrating rays are used.

In general, a larger dosage, higher filtration, more penetrating rays and longer treatment are required and, if a rapid improvement does not occur, advantage is to be taken of surgical measures at a very early moment. But the vast majority of smaller skin epitheliomata are amenable.

To exclude the unsuitable cases requires considerable experience, but, provided that there are no involved glands, that the growth is slow and that the lesion is less than two centimetres in diameter, they can generally be safely undertaken.

But it is well to warn the patient that if in six weeks or two months no marked improvement is apparent, surgical interference is required.

The question of treating squamous epithelioma with involved glands may have to be revised in view of recent developments and the use of ultra-penetrating and more selective rays, but at present I invariably refuse to touch them and decline to treat any squamous epithelioma, no matter how small, arising from the mucous membrane.

In this connexion I would like to recall to you that all cutaneous horns show squamous epithelioma changes and that in the course of many excisions for pathological examination all so-called rodent tumours, even minute, arising on the hands and forearms turned out to be squamous epithelioma.

Summary of Squamous Epithelioma Arising from the Skin.

Number of patients treated	13
Total dosage administered	86 B
Average dose per patient	6½ B
Number of patients cured	9 = 70%
Number of patients in whom the treatment failed completely (both sent as inoperable, *post operative* recurrences)	2 = 15%
Resistant patients sent for surgical treatment	2 = 15%

Other Malignant Tumours.

Miss C., aged twenty-one years, was referred to me by Sir Herbert Maitland.

On January 28, 1918, there was a large mass of malignant glands on both sides of the neck. She had been operated on in Queensland, but the disease recurred before the wound had properly healed. She was again operated upon, with clean removal of all diseased tissue and glands, but the growth again recurred within a couple of months. This time it appeared on both sides of the neck. No pathological examination had been made in this case, but it appears almost certain from the behaviour of the growth that it was lympho-sarcoma, at any rate intensely malignant. This patient received a 1 B[1] dose filtered through two millimetres of aluminium to each side of the neck. This was repeated four times to the neck, by which time all signs of the growth had completely disappeared. By way of precaution the axillary and mediastinal glands were all subjected to intensive cross-firing doses of X-rays.

On June 8, 1918, I have a note to the effect that there was no sign of the growth and that there had been none for the previous three months.

On August 7, 1918, she was given another dose of X-rays to both sides of the neck as a precaution and was allowed to go home to Queensland. I heard quite recently that she was married, perfectly well and the mother of a small family.

Miss D.—The history of this patient was very similar to that of the previous patient. She had been operated upon by Dr. Dansey in the Royal Prince Alfred Hospital. The pathological report was lympho-sarcoma. The growth recurred very rapidly after a thorough excision at the supra-clavicular region. The treatment administered was practically the same as in the previous case and the behaviour of the two growths in response to the X-rays was identical. This patient is alive and well to-day, according to a personal report from Dr. Dansey.

These two cases are particularly instructive. They are the only two cases of lympho-sarcoma that I have treated. Both patients were in a desperate state and both recovered completely and were in perfect health after four years.

The result of surgical interference in lympho-sarcoma is shockingly bad and I think that any

[1] In quoting doses estimated by pastille it must be understood that all pastilles are shaded by a filter equivalent to that interposed between the tube and the skin.

patient, no matter how desperate the condition, should be given a chance of X-ray treatment. This cannot be too strongly urged, since other reports of complete cure, even under old methods of treatment, are numerous in the literature and it is probable that in this form of malignant disease at any rate X-ray treatment is immeasurably preferable to surgical interference.

Mrs. P., aged thirty-five or forty years, had had two previous operations and a third laparotomy for second recurrence, a mass in the right iliac region, the size of the mass about that of a lemon. The pathological report on the tumours removed at the previous operations was endothelioma, probably of ovarian origin.

X-ray treatment was applied on August 18, 1920. The current used was 150 kilo-volts. The rays were passed through a four-millimetre aluminium filter and doses of 1 B were given at each port of entry. Six ports of entry were employed.

On September 9, 1920, the growth appeared to be smaller. The dose as above was repeated.

On October 28, 1920, the mass was very much smaller. The patient was seen by Sir Alexander MacCormick, who also noted the diminution. The dose was repeated, but from three ports of entry—1 B at each port.

On February 7, 1921, there was no mass to be felt, but the patient had some pain while lying on the right side. She had put on weight and felt very much better. As a precaution she was given another series of three cross-firing doses as above.

On July 29, 1921, she reported again for observation, but no sign of the previous tumour was to be felt. Sir Alexander MacCormick had also been consulted and his note also stated that he could find nothing wrong. The patient, however, attributed the benefit to "Christian Science," which may be regarded as unfortunate.

Inquiry made of her husband a week or two ago elicited the information that his wife was perfectly well. Eighteen months have elapsed after the disappearance of the growth.

DEEP THERAPY.

As I have briefly mentioned before, considerable progress has been made, principally in Germany, during recent years in treatment by means of X-rays of deep lying malignant growths.

This progress has been made almost entirely by the use of more and more penetrating rays, *i.e.*, by rays generated by a current of higher and higher voltage, from a tube at a greater distance from the skin than was hitherto thought necessary and much greater filtration up to 1.5 millimetres of copper.

By these means there was obtained at a depth of ten centimetres (a common depth of tumour masses) a much greater effective radiation than hitherto obtained, *viz.*, 25% of a surface dose or more.

Rays of this type are hardly absorbed in greater quantities by bone than by soft tissues and the principal therapeutic action is produced, not by the rays themselves, so much as by the secondary radiations provoked by their passage through tissue.

Cross-fire has also been brought into greater use and total depth dose received from these cross-firing exposures, either calculated from tables of absorption or actually measured by insertion of a meter, such as an iontoquantimeter or bromide paper, into the vagina of a patient treated for uterine cancer.

Total dosages required to destroy all malignant cells of different types are even calculated and tabulated, *e.g.*,:

Erythema, 100%
Sarcoma, 60% to 70%
Carcinoma, 90% to 100%
135% to produce injury to bowels
180% to injure muscles
50% or 60% to lower the vitality of tubercle bacilli

This work has largely been directed from the Physics Laboratory of Professor Dessauer, in Frankfurt, who has formulated several formidable laws with which I shall not inflict you in detail. But it is necessary to refer to them in some degree:

(1) Different cell forms show different sensitiveness to the same X-rays.

(2) X-rays of different penetration are to be regarded as different medicaments as long as the contrary is not proven. The difference in sensitiveness of different cells appears more marked if hard rays be applied.

(3) The aim must be to dose the diseased zone throughout its extent with the needed quantity or dose of irradiation and to have this dose of the same quality throughout.

(It is here that most previous attempts at treatment of malignant disease broke down.)

There are seven laws in all which may be seen *in extenso* in *The American Journal of Roentgenology*, October, 1921 (pages 579 and 580).

With the tables of absorption and measurement of the distance of the tumour from various surfaces, it should, according to Professor Dessauer, be possible, knowing the type of growth, to decide beforehand whether a cure can be effected or not. The accident of situation may determine beforehand the impossibility of fulfilling the requirements of the laws and make it useless to attempt the treatment. Measurements are taken, distances plotted out, number of ports of entry for radiation calculated and the dose of suitable rays determined for each port of entry and delivered with almost the certainty of cure.

Thus it would seem that the success of this deep therapy depends upon:

(1) The delivery of current at a very high voltage, up to 250 kilo-volts or even 300 kilo-volts.

(2) The production of a bundle of rays capable of passing through a very heavy filter, say, one millimetre of copper or zinc and suffering a minimum of loss by absorption in tissue intervening between skin surface and growth.

(3) The use of long skin focus distance, thus minimizing loss by diffusion, depending upon the law of inverse squares.

(4) Compensation for loss by absorption between the skin and the tumour and for loss by diffusion by cross-fire from the requisite number of ports of entry, calculated to bring the dose at the tumour and evenly throughout the involved tissues up to the fatal dose for cells of that particular tumour. This is estimated either by reference to tables of absorption or by actual measurement at the tumour, as is possible, for example, in cancer of *cervix uteri*, either by the iontoquantimeter or bromide photographic paper.

In order to produce current at 250 kilo-volts a

special apparatus has to be used, for, although it is possible to build a coil of capacity of 250 kilo-volts, it is found by prolonged experiment that a duplex apparatus (*i.e.*, a pair of coils in series and insulated in oil, thus becoming an open core transformer) gives a wave form more suitable for high penetration.

No details are given, but a bald statement, apparently explained by the tendency of wax insulation as employed in ordinary coils, to break down and, having broken, to remain so, whereas the insulation would be immediately reformed in the case of oil insulation by the rising of the gas bubble and replacement of the oil barrier. But no explanation of the wave form has so far been advanced, as far as I can find out.

Another form of apparatus used for the purpose of producing such voltages is the closed core (interrupter-less) transformer.

Both have their advocates, but in Europe the open core transformer or duplex coil (in series) is steadily gaining ground, in spite of a certain definite disadvantage in that, as compared with a closed core (interrupter-less) transformer, it gives a more peaked wave and therefore induces a more mixed bundle of rays.

This disadvantage can be and is counteracted by the use of a high tension rectifier of the Morton type, with very short contact segments, selecting only the peak of the wave, thus allowing through the tube only the current of high voltage and suppressing the base of the wave, that is, the current at lower voltages which would only produce soft rays. Moreover, the severity of the filtration used will intercept any such rays between the target and the skin and exclude the possibility of their influencing the skin adversely and limiting the effective dose at a depth.

Thus it will be seen that this disadvantage, though real, is not as great as it appears. On the other hand, the open core transformer (duplex coil) possesses many very weighty advantages:

(1) Its suitability for direct current, such as is supplied in the city (the interrupter-less transformer demanding alternating current).

(2) Its comparative cheapness.

(3) Its lesser bulk.

(4) Its greater suitability for gas tubes, which seem to be coming into favour once more for these high voltages.

(5) Its much greater simplicity.

(6) The much greater safety of operation from the consideration of possible electrocution of the operator or patient, since the open core transformer drops its voltage on load, whereas the closed core (interrupter-less) holds its voltage and a shock becomes exceedingly dangerous from the volume of current supplied by these machines.

The advantages of a close core (interrupter-less) transformer are:

(1) On alternating current as supplied in the sub-

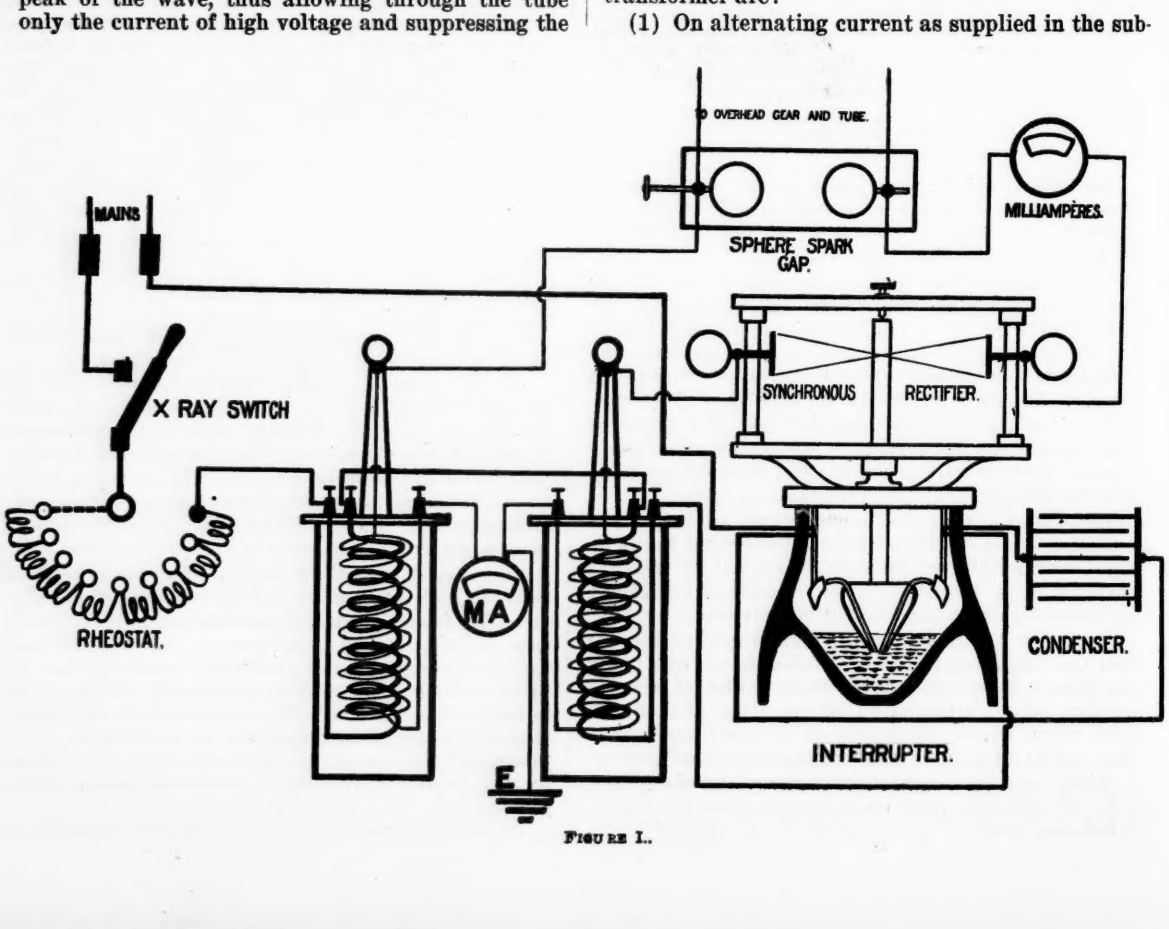


FIGURE I.

urbs, it requires no motor generator to supply direct current, working as it does on alternating current.

(2) Its steadiness of operation.

(3) Its better wave formation, *i.e.*, the more uniform voltage of the current it produces.

Against these, however, the following disadvantages have to be calculated:

(1) Its unsuitability for gas tubes, as compared with open core transformer (duplex coil in oil).

(2) And most important, the very great danger of its operation.[1] A transformer of this capacity used for commercial purposes would be kept in a locked room. These machines will give enormous currents on short circuit, quite sufficient to electrocute the operator or patient.

(3) The enormous size and weight of a transformer of this type and capacity makes it almost impossible.

The following statement of Professor Dessauer (*The American Journal of Roentgenology*, October 21, page 583) may be cited:

It is not difficult to build a transformer for 250,000 volts alternating current and more and it has often been accomplished, but to build this transformer properly and to make it stand up under continuous use, it has to be of very large dimensions and expensive. Its weight would be very great and it would hardly find room in a physician's office.

(4) Last, but not least, its excessive cost. An interrupter-less transformer of this type costs £3,000 to install and will become obsolete and valueless as soon as tubes to carry more than its maximum sustained voltages are produced, as they are sure to be produced.

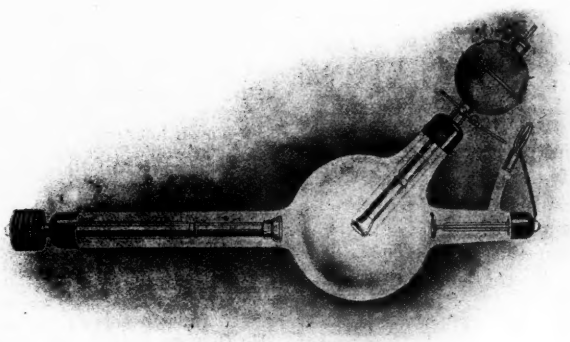


FIGURE II.
Cuthbert Andrew's Boiling Water Tube.

Professor Dessauer remarks in the same article:

Even such transformers which are properly dimensioned, for instance, for 250,000 volts continuous service, will lose their value as soon as tubes will be constructed that will stand 350,000 volts and more. Every ordinarily constructed transformer will lose its value when higher voltages are required.

It is to be hoped that, before being persuaded into purchasing such a costly apparatus, medical practitioners in this country will think long and seriously.

Tubes to be Used.

Controversy waxes strong and stronger over this question, but gradually the argument appears to be swinging more and more towards a modification of the gas tube, especially for the duplex coil (open core transformer).

As far as can be learned, the greater suitability of gas tubes over Coolidge tubes for these high voltages is best judged from the fact that Coolidge, in full possession of the knowledge of the voltages required, after a special trip to Europe, does not build his new one hundred guinea tube for more than 200 kilo-volts. This seems to show what observation has led us to suspect, *viz.*, that with hot cathode tubes, after passing 150 kilo-volts, the penetration curve flattens out very considerably and that it probably does not rise to any extent with pressure above 200 kilo-volts, whereas we know of no such limitation in the case of gas tubes.

If, then, as appears likely, gas tubes are to be used, the open core transformer (duplex coil) apparatus has a very decided advantage, owing to its greater suitability for gas tubes.

Method of Measurement to be Used.

(1) Milliampère-minute method will survive as one of the methods.

(2) Measurement by ionization will probably come into use—iontoquantimeter.

(3) Sabouraud pastille standard will have to be revised, since the present standard only applies to rays of moderate penetration and filtration. Already I have found that 1.8 B, 180 kilovolts, 0.5 millimetre copper filter will not produce an erythema, though it browns.

(4) Kienbock's bromide paper quantimeter will probably be used with a new standard, especially for measurement of the tumour, say, in the vagina for cancer of *os uteri*.

In any case new standards of dosage will have to be worked out, since with rays of such penetration the skin tolerates a larger dose than with rays of a soft or medium penetrative power.

Voltage.

The only practicable way of measuring the voltage is by use of large brass spheres—the old spark gap, even between points, becomes too large and undependable.

Types of Disease Reported to be Amenable to Ultra-Penetrating X-Rays of the Type Described.

(1) Mammary and uterine carcinomata.

(2) Sarcomata.

Dr. Stern's report (*The American Journal of Roentgenology*, December, 1921, page 745), writing on the German clinics, states:

As to the choice of cases in most of the clinics I visited I found that they have practically discontinued operating on all cases of carcinoma of the breast and uterus. They claim that the results with radiation alone are far superior,

[1] Dessauer: *American Journal of Roentgenology*, page 588.

that they get approximately 85% of cures, including all variety of cases taken at random.

These two classes really make up the largest proportion of cases to which the treatment is best adapted. In malignant growths involving other organs the results are not as satisfactory. They are all very emphatic on the importance of never treating any type of sarcoma surgically, as the chances of metastasis are very much increased by any surgical interference. The non-operated cases usually do very well.

(3) Myomata.

(4) Carcinomata of the bowel.

He is silent on the subject of carcinoma of the mouth, which is admitted, however, elsewhere as the most intractable of all.

Doses Recommended.

For sarcoma, 60% to 70% of the erythema dose.

For carcinoma, 100% to 120% of the erythema dose.

These doses must be delivered by cross-fire.

Thus it will be seen that sarcoma is approximately twice as susceptible as carcinoma and a chance is afforded to sufferers from this so often hopeless condition.

Time Occupied in Delivering the Dose.

One hundred minutes is an ordinary exposure. Great watchfulness to keep the tube and apparatus up to the requisite pitch is required and the performance of delivering an erythema dose at 180 kilo-volts with a half of a millimetre of copper filter at fifty centimetres distance is one of the most trying efforts I know. And when it comes to multiplying these by cross-fire from two, three or more ports of entry, it will be seen that it becomes exhausting.

Cost of Treatment.

The tubes cost from £40 to £100. The apparatus is also expensive. The time occupied is enormous, therefore it seems that the cost of the treatment will have to be that of a major operation.

Dangers of the Treatment.

Besides the old dangers of causing a radio-dermatitis, new and very real dangers come in. With the closed core transformer type of apparatus there is danger of sudden death by electrocution and of serious shock with a duplex coil. Then there is the certainty of fairly severe ray-sickness, probably due to absorption of destroyed cellular material. But the principal danger and the one which limits the area of exposure, is the destructive action on blood cells, causing an acute anæmia which may be fatal in patients already anæmic and debilitated as a result of their cancer.

Widely disseminated metastatic growths thus preclude the use of this form of treatment, though regional glandular involvement can apparently be coped with.

Transfusion of blood after the exposure has overcome some of the risks of irradiation of anæmic patients, but such cases can only be dealt with when the patient and relatives fully appreciate that the treatment implies the risks of a major operation and a tricky convalescence.

Injury to the bowel may result from too much cross-fire, 135% of the erythema dose causing ulceration.

Dangers to operators and attendants from X-rays have to be carefully guarded against. These ultra-penetrating rays pass through almost anything and a minimum of two millimetres of lead protection must be provided and used. The tube box has to be protected to a similar extent.

Method of Application.

The number and size of the ports of entry required having been ascertained, the patient is given a dose of morphine, the ports marked out on his skin and a four-hour sitting commences, the patient remaining drowsy through the sitting, being turned from time to time to suit the requirements of the treatment.

One treatment suffices to kill all the cells in the area of cross-fire, but a second exposure after six weeks to include more distant glands seems to be the rule now.

The treatment should be completed, if possible, at one sitting, so that the cancer cells receive their quietus at a blow.

Under-dosing is to be as carefully guarded against as over-dosing, since under-dosing means irritation and increased growth.

Miss B., aged forty years, had a huge, slowly growing, malignant growth, apparently arising from the left antrum. It had been noticeable for the past four years. Its growth had been rapid for six months. It was projecting on August 11, 1921, like a cricket ball from the left cheek; the left eye bulged forward, apparently by invasion of the floor of the orbit. All the surgeons consulted had refused operation. She was therefore sent by Dr. Poate for deep X-ray therapy. The first treatment of two cross-firing doses was given from in front and from the side of the face, including the eye; the current was 180 kilo-volts; the skin focus distance was fifty centimetres. A dose of 1 B was applied to each port of entry.

On October 6, 1921, the patient was much better. There had been no pain since the exposure and no reaction. The patient could now see with the left eye, which had been almost totally blind, apparently from tension on the optic nerve. The tumour was noticeably diminished in bulk. The dose was repeated as before.

On November 29, 1921, it was found that there had been no reaction, but a wonderful diminution of the growth. The bones of the face was palpable. One mass was present as big as a walnut just under the malar bone. The eye was less prominent. There had been no pain whatever since the institution of treatment.

On December 5, 1921, the dose was repeated, but only 0.5 B was applied to the lateral aspect.

On January 9, 1922, there was no reaction. The dose was repeated as above in one direction only, 1.5 B being given.

On February 16, 1922, it was noted that the improvement had continued. A dose of 1 B was applied to both ports of entry.

On April 6, 1922, a small mass was still just palpable under the malar bone. The dose was repeated.

On May 15, 1922, the dose was again repeated. The condition at present is excellent. There is a small lump still remaining, which seems only fibrous and deformity due to distension and distortion of the superior maxilla by the pre-existing growth. It is yet too early to say, but it certainly appears that this case is going to result in a cure. The patient is, however, still under treatment and observation and further information is required before a pronouncement can be made that there are no active cells left.

The dose is quoted in "B" to denote that the method of measurement was by Sabouraud pastille. We now find by experiment that the full erythema

dose of rays of this degree of penetration is approximately "2 B," perhaps more, so that this patient has not received on any occasion anything approaching the full dose, which makes the result obtained the more remarkable.

The second case, on the other hand, appears a failure:

L.B., aged six years, had infiltration of the muscles of the left lower leg and knee, with cells, pronounced by Professor Welsh to be malignant hæmangioma with local infiltration. The parents refused to consider amputation unless all other measures were exhausted. This patient had doses totalling 1 B on each area over the whole of the inner and outer aspects of the leg. The growth, which was carefully measured at the beginning of treatment three months ago, has not increased nor extended at all, but, on the other hand, it has not diminished. It seems useless to continue this line of treatment further and I have almost persuaded the parents to have the amputation performed.

Conclusions.

It is very well to be cautious in estimating the value of this method of treatment, but, on the other hand, there is no sense in dismissing the subject with mere unreasoned scepticism.

It is to be remembered that the Americans thought it worth while to invite Professor Dessauer to explain his methods and to advise on technique and apparatus, after sending over a committee to Germany to report on the work done there and more especially in Frankfurt by Professor Dessauer. It must also be remembered that a large commercial firm, the General Electric Company, thought it worth while to send over their special X-ray expert (Dr. Coolidge), who also reported favourably and immediately set to work to produce a tube to carry a current approximating to the required voltage.

It must also be taken into consideration that, according to reports given to American medical associations by their representatives and according to information from other sources which have not been contradicted, the German clinics, especially in Frankfurt and Freiburg, have practically discontinued operating on all cases of carcinoma of the breast and uterus.[1] The German surgeons have not deserted the field until convinced that they had to make way for more efficient methods.

It must be remembered that almost all the hospitals in Europe and America considered it worth while to install thousands of pounds worth of apparatus to carry on the work and it must be remembered that so far no contradiction of the claims put forth on behalf of the ultra-penetrating X-ray therapy has been made, no adverse criticism has been offered even in Germany, where it has been in operation since 1915.

I cannot do better than conclude with a quotation from Dr. Stern's report from *The American Journal of Roentgenology* of December, 1921 (page 745):

As regards the future of this "intensive therapy," I do not think there is the slightest doubt that it has come to stay. It is not a fad, but is founded on carefully worked out scientific bases. In fact, I feel quite certain that in time they will be using currents of even higher intensity. In a number of clinics they are even installing machines that are capable of delivering up to 300 kilo-volts and are merely waiting for tubes that will stand up under this current to begin using them. There is no doubt that in some cases of malignancy it shows results that with our present technique are impossible. For instance, I saw a patient in Berlin at the clinic of Professor Warnekros who was treated four years previously for an inoperable carcinoma of the uterus, involving the fundus, both parametrium, with deep-seated pelvic and inguinal glands. On examination I found the uterus freely movable, with no sign of any thickening in any part of the pelvis that I could find. She gained 50 lb. since the treatment and looked the picture of health, a result that with our present technique seems too good to hope for.

[1] *American Journal of Roentgenology*, page 745.

Reports of Cases.

RUPTURE OF THE UTERUS.[1]

BY R. I. FURBER, D.S.O., M.B., CH.M. (SYDNEY),
Honorary Assistant Gynæcologist, Sydney Hospital.

I WISH to bring to your notice a case of complete rupture of the uterus.

Mrs. F., *ætatis* 34, a *multipara*, was exceedingly fat and as we discovered later had a lax, pendulous abdominal wall. She had been suffering from a severe bronchitis before admission to hospital, but apart from her confinements her previous medical history had been uneventful. The first two confinements she described as long, but easy. She was attended on the third occasion in November, 1918, by Dr. West, of Camden, who informed me that he was called in consultation and, finding a brow presentation, converted it to a face and delivered. The menstrual history was perfectly normal and the last period was seen on March 14, 1920.

Labour commenced at noon of June 22, 1921, apparently a fortnight over time, and progressed fairly steadily according to her friends. The pains gradually became more severe all next day, being almost continuous and agonizing by 1 a.m. on June 24, 1921. It was only then that it was decided to call in a doctor, who administered chloroform and attempted to deliver with forceps. Not succeeding and realizing the gravity of the case he sent the patient immediately into the South Sydney Women's Hospital. Here she was seen by Dr. Nixon, who diagnosed ruptured uterus, the head being palpable in the right hypochondrium, while the contracted uterus was plainly made out below the umbilicus and somewhat to the left of the middle line. There was very little vaginal bleeding and no dulness could be made out in the flanks.

The patient was by this time in a desperate condition, being extremely anxious, restless, with ashy grey features, running pulse; in fact, she appeared to be moribund. Notwithstanding that the fœtus had been practically expelled from the uterus, she still complained bitterly of agonizing, continuous pain.

Under ether anæsthesia at 3 a.m. on June 24, 1921, the abdomen was opened and the fœtus immediately encountered, lying as it had been palpated, but the legs were not completely expelled from the rent in the uterus. The fœtus was delivered and the placenta manually separated and removed through the tear.

Although there was no free blood in the peritoneum, the uterine vessels began to bleed immediately the fœtus was removed, the contracting uterus having apparently controlled the vessels by pressure against the fœtal parts. It was difficult to see the bleeding point, so a supra-vaginal hysterectomy was done as rapidly as possible from the opposite side when the uterine vessels were fairly easily picked up and ligated.

The ragged uterine tear ran obliquely across the right border of the lower uterine segment from below upwards and backwards. The fœtus, making its exit through the bare area of the lower uterine segment, had apparently stripped the peritoneum off the side wall of the pelvis as far as the *caput caeci*, on which a vessel had actually to be

[1] Read at a meeting of the New South Wales Branch of the British Medical Association on May 26, 1922.

tied, and had broken through the peritoneum anterior to the infundibulo-pelvic fold.

Over-sewing the uterus and lacerated peritoneum with all possible speed, the abdomen was rapidly closed and the patient removed with the fervent prayer that she would live long enough to develope a hernia.

She began to improve straight away with intravenous injections of saline solution, there having been no loss of blood to indicate transfusion. She developed her hernia as promptly as anyone could wish on the second day, the violence of her coughing causing the roughly sutured incision to break down. Then, however, her condition was quite good and with a second anæsthetic the wound was satisfactorily sutured and she now has a good, strong scar.

Convalescence was slow, but the only thing of note was that she had some yellow vaginal discharge, coming apparently from the cervix.

The pelvic measurements made subsequently were: interspinous, 24.1 centimetres (9½ inches); external conjugate, 19 centimetres (7½ inches); intercristal, 25.4 centimetres (10 inches), diagonal conjugate, 10.8 centimetres (4¼ inches), indicating a flat pelvis with a true conjugate of about 7.9 centimetres (3¼ inches). The fœtus weighed 4.29 kilograms (9½ lb.) and the cranial bones were certainly no softer than usual, bearing out the possibility of some post-maturity, as suggested by the dates.

A marked cystocele and rectocele and a laceration of the cervix on the right side that did not appear to be recent, gave evidence of severe trauma at previous confinements.

In reviewing the case, it is difficult to attribute specifically the rupture to either the powers, passenger, passages or trauma.

A fat multipara with a weakened belly wall is the commonest victim of ruptured uterus and it may be that the accessory expulsive forces are ineffective in degree, leaving all the work to be done by the uterine musculature, which overacts and in doing so thins out the lower uterine segment to such an extent as to cause rupture. The pendulous belly wall is a predisposing cause of rupture directing the force against the posterior part of the lower uterine segment, but the usual site for a tear of this nature is the posterior-vaginal wall.

The passenger being somewhat large, with a rather hard head, was a definite predisposing cause.

The possibility of some malpresentation, such as occurred in the previous confinement, would have to be considered, as this might easily have been overlooked if the patient's condition at the time when the doctor was called in be remembered.

The pelvic measurements showed considerable contraction in all diameters, particularly the antero-posterior. Considering as part of the passages the lower uterine segment and cervix, we come again to a predisposing factor. The severe laceration was, I think, the result of a previous confinement and was so marked and deep as to suggest that an incomplete rupture had occurred then. This scar, in addition to preventing adequate soft dilatation of the *os utcri*, could easily be imagined as the weak point where the rupture actually started.

Dr. K. Inglis's pathological report contains the statement that there was a good deal of evidence of recent acute inflammatory changes in the superficial layers of the tear. This infection probably occurred some hours at least before the actual rupture.

There was also some evidence of hyaline degeneration of the musculature adjacent to the tear.

It will be freely admitted that it is extremely difficult to make an accurate diagnosis when the practitioner is only called in at the last possible moment and is given a history either very inaccurate or intentionally garbled by the nurse to cover herself against blame.

It is undoubted, to my mind, that the uterus had been contracting violently before the application of the forceps and rupture was clearly imminent or had actually occurred. Traction on the head would be most likely to cause a transverse laceration, so that if the forceps were the cause of the rupture, the trauma would have occurred during their application.

When all the predisposing causes are considered, a fat multipara with pendulous, weak belly walls, a post-mature fœtus, a contracted pelvis, a cervix fibrous from child-bearing, with a definite deep scar providing a weak spot to rupture, we find quite sufficient cause for the trouble without blaming the trauma from the forceps application.

Treatment.

It is impossible to say that there is no internal bleeding in any given case and it is equally impossible to foretell that the degree of shock is going to decrease, so that immediate abdominal section is always indicated in complete rupture.

It is only in exceptional cases that the obstetrician would be justified in conserving the uterus, for the following reasons.

Infection of the uterine cavity is usually the cause of death in Cæsarean sections, spreading as it does to the peritoneum and in women who have probably been infected a hysterectomy is clearly indicated. The purulent vaginal discharge in this case and the pathological report make it certain that infection had occurred.

The tear is usually very ragged and when situated in the usual site low down in the uterus the difficulty of suture is greater and causes more delay at a time when every minute is precious than does hysterectomy.

I would like to point out that the difficulties encountered in treating a rupture of the uterus low down in the uterine segment are so great as to make me very cautious about advising the low Cæsarean section that has been written about so much recently. In addition to the increased difficulties attendant on separating the bladder, incising the uterus and delivering the child, the great risk of subsequent rupture in the weakest part of the uterus, possibly involving the bladder or ureters, make it an operation of very doubtful utility.

The main lesson to be learnt from this case is the one to be learnt from 95% of all accidents of pregnancy and parturition, namely, that it would have been avoidable by the exercise of adequate ante-natal care.

A good deal has been written recently on obstetrical subjects, and it is a very healthy sign, showing as it does that the profession realizes the necessity of establishing midwifery in its correct position as the sister art and science of medicine and surgery rather than their scullery maid.

Unfortunately, some of those who hold that parturition is a physiological process and should be treated as such by the absolute minimum of interference, have been somewhat intemperate in their condemnation of the practitioner.

These communications may be justified by the acts of a minority of unskilled or conscienceless practitioners, but I am afraid they may tend to prevent that considered and timely interference which can do much to alleviate the pains and results of labour.

Reviews.

A WEAK RADIO-ACTIVE PREPARATION.

THE term "slow-radium" is used by Mr. Kramer[1] to designate a radio-active substance which contains uranium, radium and thorium salts. This substance is quite inexpensive as compared with pure radium bromide and Mr. Kramer suggests that it may be used therapeutically in place of the latter in certain diseases of the skin, *et cetera*. He proposes to make up for its weakness in radio-activity by increasing the time of application accordingly. He states that the number of α particles emitted per square inch from his preparations is about 5,000 to the second and that the number of α particles emitted from one milligramme of pure radium bromide is thirty-four millions per second. If we calculate five milligrammes of pure radium bromide to the square centimetre, we would have thirty

[1] "Radiations from Slow-Radium," by John B. Kramer, with a Note on Their Therapeutic Value by John Hall-Edwards, L.R.C.P. (Edin.), D.M.R. & E. (Cantab.), F.R.S. (Edin.), Honorary F.R.P.S., Late Major, R.A.M.C.; 1921. London: Baillière, Tindall & Cox; Demy 8vo., pp. 105, with 53 figures. Price: 12s. 6d.

milligrammes to the square inch and that would give about 1,000,000,000 α particles emitted to the square inch per second.

Thus the comparative strength of these preparations is that one unit of pure radium bromide is equal to 200,000 units of "slow-radium" preparation. If the time of application of the pure specimen be arranged for a four-hour application, the "slow-radium" application would have to be of the order four times 200,000 hours, which is equal to about ninety years. "Slow-radium" is certainly an appropriate name for this substance.

Mr. Kramer claims for his "slow-radium" preparation that it has an elective action upon the superficial tissues as compared with pure radium bromide specimens. In support of this statement he describes with illustrations several experiments carried out with these two substances. The experiments show the different results obtained as regards the reduction of silver salts, when photographic films are exposed to the radio-active properties of these two substances, "slow-radium" and pure radium bromide.

As Mr. Kramer with one exception fails to state the different quantities of these preparations used in his experiments, the experiments are not comparable and the results he obtains cannot be taken to prove anything in this matter. The experiment in which the quantities of the substances used are given, is described on pages 58 to 62 with illustrations on pages 61 and 62. In this experiment fifteen milligrammes of pure radium bromide (α rays cut out) was exposed to an X-ray film for two hours. The result of this experiment is compared with an exposure of "slow-radium" preparation over five square inches (α rays cut out) for seventy-two hours. Now, if we work out the respective strengths of these substances, it is at once evident that the experiment is not scientifically carried out. The activity of fifteen milligrammes of pure radium bromide is equal to an emission of $15 \times 34{,}000{,}000$ α particles per second, whereas that of five square inches of "slow-radium" is only equal to an emission of 25,000 α particles per second. It therefore follows that a two-hour exposure of the pure specimen does not correspond to a seventy-two hour exposure of the "slow-radium."

The pure radium bromide specimen is about 20,000 times stronger than the "slow-radium" specimen and in order to get a fair trial of the two substances in this way the respective exposures should be of the order of two hours of the former and 40,000 hours instead of seventy-two of the latter.

But pathological cells would not be affected in the same manner by these prolonged exposures. If a dose of twenty drops of tincture of opium were given, the patient would get a sedative effect and relief of pain, but if he were given one drop a day for twenty days, there would be practically no therapeutic effect.

Many radium therapists have experimented with weak radio-active substances, but the results have not been satisfactory. Of course, these substances can be applied to a large surface, as in cases of eczema, but in such conditions it is usual to apply the X-rays, which are very effectual in generalized inflammatory conditions of the skin.

THE TREATMENT OF COMMON FEMALE AILMENTS.

IN the preface to this little volume on "The Treatment of Common Female Ailments,"[1] Dr. F. J. McCann gives its *raison d'être*: "It is written to serve as a guide to the practitioner in the treatment of those common female ailments encountered in the course of an ordinary general practice." Into one hundred and fifty pages Dr. McCann has packed a surprising amount of valuable teaching and the lessons are conveyed in a clear and convincing manner, one that makes a direct appeal to the general practitioner's sense of responsibility. Whether the assimilation of that teaching will lead in individual cases to the assumption of the rôle of gynæcologist is a matter that must be left to conjecture. The important point is that the author, as far as may be, safeguards the situation for the man in general practice, laying down the lines of an accurate diagnosis and supplying him with treatment based upon a wide experience.

Especially good and helpful are the chapters on menstrual disorders, uterine and vaginal discharges, uterine hæmorrhage and cancer. The clinical pictures are well drawn, there is a sense of proportion in the presentation of details and the treatment is practical and well defined. The chapters on abortion and pregnancy presuppose, in Dr. McCann's mind, for some practitioners at least, a defect in obstetrical training and experience—and Dr. McCann should know. We cannot see eye to eye with Dr. McCann in every direction. Thus, for example, all gynæcologists will not agree with his treatment of spasmodic dysmenorrhœa in the virgin by dividing with a sharp, thin knife "the anterior cervical wall for half its depth from internal to external *os uteri* and then the posterior wall in like manner" and then the passing of a dilator "so that you make two cuts instead of innumerable tears." Again, in the case of married women, he favours the introduction of a glass stem or gauze plug into the cervical canal and advises allowing it to remain *in situ* for from twenty-four to thirty-six hours, in order to maintain the dilatation.

We must also differ from him in his use of laminaria tents for dilatation of the cervix in patients suffering from inevitable abortion. He believes that they can be made quite aseptic and that "there is no method of dilating the cervix to be compared in the matter of efficiency with them." However, *suus cuique mos.*

Dr. McCann's style is aphoristic and, when needs be, dogmatic—pleasantly so. The little book is a great deal more than pemmicanized gynæcology; it covers a wide range, represents scientific principles as well as sound practice and can be highly recommended to the senior student and general practitioner. The gynæcologist, *pur et simple*, will find it excellent reading.

[1] "The Treatment of Common Female Ailments," by Frederick John McCann, M.D. (Edin.), M.R.C.P. (London), F.R.C.S. (England); 1922. London: Edward Arnold & Company; Demy 8vo., pp. 152. Price: 8s. 6d. net.

University Intelligence.

UNIVERSITY OF ADELAIDE.

THE following report of a visit by MR. H. HEATON, M.A., Lecturer on Economics, on a visit to the River Murray Settlements in February and March, 1922, was presented to the Council of the University at the April meeting:

Tutorial Classes in Rural Settlements.

IN accordance with the decision of the last Joint Committee Meeting, I made arrangements to visit the irrigation settlements during the vacation. In all nearly a fortnight was spent in Renmark and the townships to the west. Afterwards I went over to Wentworth and Mildura, in order to see whether it would be practicable to regard these places as an administrative part of South Australia for tutorial class work. The date of my visit was unsuitable for public lecture work; the picking was in full swing and it was evidently unwise to attempt the arrangement of public meetings at that time of the year. Still I addressed three meetings, one at the Renmark settlement, where the schoolmaster hurriedly gathered together an audience of about forty residents. I was also given an opportunity to address the members of the Renmark Institute at the end of the annual meeting of the Institute. I met a group of leading citizens at Berri. Apart from those meetings, most of my time was spent in travelling round amongst the vineyards, interviewing people in their homes or on the blocks or in calling upon possible supporters in the shops, offices and schools of the towns. I interviewed nearly sixty people in this way. Having surveyed the district as thoroughly as possible, I wish to submit the following observations:

(1) Possible Centres.

The irrigated area, when fully developed, will be a compactly settled strip of about thirty miles by six miles, ranging from just north of Renmark down to Moorook and Kingston. Along this strip the most important settle-

ments are or are likely to be Renmark, Berri, Barmera, Monash and Glossop. The first two places are now well settled, Renmark having a population of about 2,600, whilst Berri will shortly have 2,000 people living there. To the north and west of Berri the new settlements are being made. At Monash about 180 returned soldiers are living and, as this area was planted three years ago, it has its hall, institute and model parliament and has developed a keen community spirit. Glossop, Weigall, Kingston, Moorook and Cobdogla are not so far advanced and two or three years must elapse before the settlers there have much time to think of social or educational effort. Barmera, which is planned out for a town of 25,000 people and is to be the administrative headquarters of the district, is at present composed of irrigation officials, engineers, clerks, artisans and labourers. These settlements grow rapidly and at a very early stage in their existence establish institutes or similar bodies. The institutes at Berri and Renmark and well developed. The model parliament at Monash is combining the functions of a literary and debating society with those of a municipal council and an agricultural bureau. At Barmera and Lyrup vigorous literary and debating societies exist.

The early formation of these bodies is an indication of the quality of most of the settlers. The returned soldier section of the population contains many high school and college men; there are a number of ex-clergymen and ex-teachers and the officials connected with the irrigation work include a number of science graduates. The whole population is intellectually of a much higher standard than that found in ordinary farming districts and hence a large portion of the settlers are sympathetically inclined towards any form of educational activity. In fact, I found throughout the whole area a wide-spread interest in educational matters. The settlers want to have good primary and high schools for their children and are prepared to work strenuously in order to secure and to support such facilities. From this they turn quite willingly to the admission that adult education should be made available as extensively as possible in the district. Not one person amongst all those I interviewed was hostile to my mission. All agreed that the formation of classes was desirable and necesary and most of them offered to support any classes which might be formed and to become students themselves. At each place I found men, chiefly young men, who on learning the reason of my visit took charge of me and devoted a whole day to guiding me round the district in order that I could meet people who might be interested in our work. This ready sympathy was not confined to any one place. I found it equally strong in old settlements like Renmark and in new ones like Barmera.

I know of no district in the State where the promise for successful class work is so good or the need so great as in these Murray townships. The new settlers are all young; they are eager to learn and many of them show a wide interest in economic, political and international problems. The formation of institutes and the like indicates that they wish to obtain facilities for reading, study and discussion, but the quality of the work they are capable of doing is limited by the absence of any sufficiently qualified guide or teacher. Hence the adult educational work which is actually done, is spasmodic, disconnected and often of inferior quality. The presence in the district of a qualified tutor would remedy these defects.

The need for adult educational work may be stated from another standpoint. Life on these new settlements means strenuous and rather monotonous work on the land. The facilities available for men in their leisure time are few and primitive. The picture-house and the dance claim their hundreds of adherents, but it is not always possible to get into Renmark or Berri for an evening. Hence in some places drinking and gambling are the only possible recreations. This applies especially to such a place as Camp No. 16, where some hundreds of semi-skilled and unskilled workers are engaged in making concrete pipes. Housing accommodation is primitive and therefore men herd together in the evenings on drinking or gambling bouts. Any comments which I made on this topic were always met by the reply: "What can you expect? They have nothing better to do." Isolated lectures given by the Reverend F. H. Durnford, of Berri, at the outback camps have always drawn large audiences and discussion has usually been keen and prolonged. Mr. Durnford quoted many instances of good brains going to waste simply because of the lack of any educational food. It is impossible to avoid noticing this problem of the use of leisure. The picture-theatre has played a beneficial part in providing an alternative to the drinking gang and the gambling school; the institutes have some influence, but all with whom I spoke, felt that the commencement of classes in the district would be an invaluable aid, even if it did no more than keep men in their spare time away from low forms of enjoyment.

(2) Local Tutors.

Throughout my visit I looked for men who had the necessary ability and leisure for taking charge of study circles or tutorial classes. I failed, however, to find anyone into whose hands it would be safe at first to put the leadership of a group. Most of the clergy in the district are either inadequately educated or hopelessly overworked. Mr. Durnford, the only clergyman in the area who might have done good work for us, is leaving for Egypt this year. The ex-teachers who have settled on vineyard blocks, are too fully occupied at their work to be able to spare the necessary time for the preparation of series of lectures. In the rare cases where a likely man seemed to have been found, I discovered that he was generally leading some section in a local political controversy and would therefore probably be unwelcome to the other side. The lawyers and doctors are all much too busy and the best educated man in the district, Mr. Taylor, editor of the *Renmark Pioneer*, cruelly overworks himself. Further, were an attempt made to start classes led by a local clergyman, the quality of the work would come to be regarded as being little different from that of an ordinary literary society. The same objection must be made to any proposed formation of study circles. It might be possible at Barmera, where a great number of technical experts reside, to form a study circle to work through some text-book, but here again there is no one suitable for appointment as permanent leader to such a circle and the proceedings would be little different in quality from those of already existing literary and debating societies. It is necessary in order to maintain the standard of our work that the beginnings should be in the hands of some properly qualified teacher. Work by local tutors might come later to supplement the tutor's classes by some local leader, but, surveying the whole field, I can reach only one conclusion, namely, that a full-time tutor should be placed in the district if the Committee intends to make provision for these settlements.

(3) Cost of Tutor.

The travelling expenses of a tutor working at Renmark, Berri, Barmera and Monash or Glossop are not so great as I had anticipated. There is an excellent daily motor service throughout the whole area and the manager of one motor company promised that, if necessary, he would recommend to his board that a tutor travelling weekly from a district would be allowed to make the double journey, breaking it whenever required, for single fare. Hence a tutor stationed at Renmark could visit three other places weekly, taking four tutorial classes in all, at a motor fare of 12s. 6d. a week. Hotel accommodation is now available at Renmark and Berri. A tutor visiting Monash, Barmera or Glossop would have to rely on the hospitality of some settler, as no hotel or boarding-house is yet established at those places. I was assured there would be no difficulty in arranging such hospitality. The maximum cost weekly to the tutor would be £3 for board and lodging and 12s. 6d. motor fare. I estimate therefore that the total cost of a full-time tutor for the district, assuming a salary at £400, would be not more than £450. The provision of such a tutor is impossible unless the grant for the tutorial class work is increased. If the Joint Committee decided to wait on the Minister of Education for such an increase, the institutes and other organizations already established in the district have promised to support the request. Failing such an increase, I feel that the Joint Committee should draw the attention of the Extension Lectures Committee to the position on the Murray and urge that, if possible, short courses of extension lectures be established during the May and August vacations.

The Medical Journal of Australia

SATURDAY, JULY 1, 1922.

The Treatment of Venereal Disease.

IN Australia we have legislation peculiarly our own for dealing with the terrible scourge of venereal disease. It is true that this legislation is experimental. It is also true that it does not cover the whole problem. In the year 1916 the Western Australian Parliament passed the first modern *Venereal Diseases Act* and thus led the way for the other five States to follow. In the course of five years information has been collected from which it may be possible at a later date to determine whether this Act has resulted in a reduction in the incidence of these diseases. In February of this year a conference was held at the instigation of the Prime Minister for the purpose of considering the degree of effectiveness of the measures adopted for the prevention and control of venereal diseases. At this conference the opinion was expressed that the Acts had not been in force for a sufficiently long period to enable the authorities to arrive at any conclusion concerning the value of the measures as prophylactic weapons. The members of the conference were of one mind in demanding the enforcement of the clauses providing compulsory treatment and the suppression of treatment by unqualified persons. It will be remembered that the several Acts are based on the idea that prevention may be attained by means of anonymous notification, compulsory treatment by competent practitioners and punishment for conscious transmission of infection. From the national point of view the treatment of the individual becomes important only because effective treatment shortens the period of infectivity and because a person under treatment by a responsible practitioner would be influenced to avoid all acts that might result in a further spread of infection. Treatment, even if cure cannot be guaranteed, is necessarily of value in all infective processes, because of the control that can be exercised over the patient.

It has long been known that the enforcement of the compulsory treatment clauses is hedged in with difficulties. The patient would prefer in the majority of instances to consult a pharmacist or an irregular practitioner, partly because he would wish to evade the notification of his infection, even if this be anonymous, and partly because he labours under the delusion that this clandestine treatment is less expensive than that of a registered medical practitioner. The object of the legislature is obviously not to impose hard conditions on the patient, but to secure adequate treatment in every instance at an early stage of the disease. Under ideal conditions of administration of the Acts the infected person would be compelled to seek the advice of a registered medical practitioner and would be kept continuously under treatment until he is no longer a menace to the community. Much vigilance would be required to prevent this treatment being given by a pharmacist or an irregular practitioner. In actual practice, however, this vigilance is not exercised in the majority of the States and prosecutions are consequently rare for a breach of this provision of the Acts. In actual practice, too, the patient frequently gives a false name and address to the medical practitioner with whom he may consult, with the result that default in regard to continued attendance cannot be prevented. In a small community this form of evasion may be difficult; in a large city the patient knows that he will not be discovered if he gives a false name. No means have yet been devised to meet this difficulty. The general practitioner cannot be expected to play the part of detective and it therefore rests with the health authorities to take steps to render this form of evasion as dangerous an expedient as it can be made.

The authorities have a further obligation in regard to treatment. If compulsory treatment is essential for the control of these diseases, it follows that ample provision for institutional treatment must be provided. This means the establishment of out-door clinics and the provision of special accommodation in the wards of public hospitals. Certain diseases are regarded as dangerous to the community and persons suffering from any of them are required to

submit to effective isolation, if necessary at the expense of the authority. There is no question about the right of the health authority to remove a person suffering from a dangerous communicable disease, such as variola or diphtheria, to a place of safety. When influenza visited Australia in pandemic form special hospitals were immediately established to accommodate as many persons as might become infected. It is not inconsistent to demand the provision of ample isolation for persons suffering from an endemic infection of a dangerous nature, like syphilis or gonorrhœa. The State has therefore the obligation to find money to establish and maintain clinics and special wards for all persons suffering from venereal diseases whose home conditions do not admit of effective isolation. The managing boards of the majority of the large and small public hospitals are ready to assist in this endeavour, provided that the expense is borne by the Government.

There appears to be a tendency on the part of some of the boards of management of hospitals to introduce a complicating element in the machinery required for providing skilled treatment for all persons with venereal diseases. The venereal diseases clinic could be kept quite distinct from all other departments of a hospital were it restricted to persons who have recently acquired a venereal infection or who fear that exposure to infection may have resulted in the development of one or other of these diseases. The medical officer in charge of the clinic might confirm the diagnosis or correct it and transfer the patient to a subdivisin for syphilis or gonorrhœa as the case might be. Such a system would lead to a refinement of specialism which would be to the disadvantage of both the patient and the practitioner. On the other hand, the clinic is inevitably used by persons who are suffering from the more remote manifestations of venereal diseases, especially syphilis. The differential diagnosis in many instances becomes the task of the dermatologist, since the lesions are frequently situated in the skin or in the mucous membranes. While every medical practitioner should take steps to equip himself by studying modern methods of diagnosis and treatment of venereal diseases, to enable him to give effective treatment to all suffering from these diseases; those in charge of the venereal disease clinics at the larger metropolitan hospitals should be especially competent to distinguish between the rarer forms of non-syphilitic dermatoses and specific skin lesions. In two hospitals only in America are the clinics divorced from the skin departments; in all other hospitals throughout the world the combination is regarded as expedient. Moreover, if a specialist in venereal diseases were to be recognized, the physician would have to refer to him all patients suffering from gumma of the liver or lung, the neurologist would have to pass on to him all patients with locomotor ataxia and the gynæcologist would be debarred from attending to a woman with gonorrhœal salpingitis. There is no need for complications of this kind. In our institutions for the treatment of the sick the experience of all the medical officers should be available for any patient. The venereal diseases clinic can be safely entrusted to the dermatologist, who, if he be wise, will be a team-work man. It would seem that treatment will play a large part in the prophylaxis of venereal diseases when the public begins to realize that health can be restored expeditiously at the well-equipped and skilfully-managed clinics attached to the large public hospitals. Good work always gains recognition in the long run.

THE LABORATORY AND MODERN MEDICINE.

THE pristine art of the old-time physician is rapidly being forgotten in the forward progress of modern medicine. It is not so many years since medical students were taught that they had to rely on their interpretation of symptoms and physical signs in establishing a diagnosis. The physician's armamentarium consisted in little more than his wooden stethoscope and his clinical thermometer. The accurate determination of the diagnosis of an obscure and difficult case was, in those days, the unaided product of judgement and discrimination that had been matured by time and widened in outlook by variety of experience. With the gradual growth of pathology and bacteriology and with the opening up of the field of medical research, new possibilities were manifested and many weapons were added to the equipment of the physician. This has reached such a stage that the present-day student of medi-

cine is well-nigh bewildered by the multiplicity of detail—chemical, bio-chemical and bacteriological—that he has to endeavour to understand and assimilate.

When he starts practice, however, he will find that there is much scope for the application of the pathological knowledge that he has acquired. Many of the more common tests and examinations can and should be undertaken by him. There is no reason why the practitioner in charge of a case, be he general practitioner or physician, should not undertake such ordinary procedures as the staining of sputum for the discovery of the tubercle bacillus, the examination of a blood film for the malarial parasite or a differential blood count. If he be resident near the city and have a busy practice, it is possible that he may prefer to have these examinations done for him by a pathologist. If he lives in the country, he will have to find time to do them himself. In either case, to disregard such essential tests and to carry out the treatment of a patient without them must be looked upon a sa slip-shod and careless method of treatment and one that is not in the best interests of the patient. Occasions often arise, in dealing with an obscure and difficult case, when laboratory tests of considerable complexity have to be undertaken. Here care and watchfulness are necessary. The practitioner in charge of the patient may not be *au fait* with all the laboratory methods or, if he does understand them, be conversant with their applications in different directions. It is necessary to get the advice of an expert. Here the pathologist is something more than "a penny in the slot" machine to whom a specimen and a fee are sent and from whom a report is received in due course. The pathologist should be permitted to see and examine the patient. If this course be impossible owing to distance or for some other reason, a full history of the patient's illness must accompany each specimen that is sent to the laboratory for report.

The suggestion has recently been made by Dr. Lucien Achard that the patient should come to the general practitioner or physician by way of the laboratory, with all the necessary tests already made, and, further, that the pathologist should be the person to determine which tests are required in a given case. The objections to this are obvious. A patient will, in the first instance, always seek advice from a general practitioner or a physician and the latter will have to shoulder all responsibility in regard to diagnosis and treatment. The pathologist is and must remain purely a consultant. It is the duty of the practitioner in charge of the patient to determine when the advice and help of a pathologist are necessary. He may either send the patient to the pathologist with a letter or, better still, arrange a consultation. Collaboration thus brought about is likely to be of the greatest use to the patient, whether it be from the point of view of diagnosis or from that of treatment. Such team work must be regarded as the ideal method. The principle is applicable to all branches of medicine and must be recognized by the members of the profession. At the present time an out-patient at one of the large metropolitan hospitals receives the most scientific diagnostic investigation. The opinions of various experts in special branches are obtained as a routine procedure when a special system is involved in the disease from which the patient is suffering. He gets most team work. The same conditions should be encouraged and sought in private practice.

TULARÆMIA.

IN 1910, Pearse, of Utah, reported several cases of infection occurring in human beings, caused, in his opinion, by the bite of a large black and yellow horse fly. The site of the bite became swollen and infiltrated and necrosis of tissue occurred, with formation of an ulcer. Lymphatic glands draining the area of the bite became swollen and tender and eventually suppurated in about half the number of patients affected. In all there were constitutional symptoms varying from slight malaise to fever of varying intensity and even death of the patient. In 1911 McCoy described a plague-like disease occurring in rodents and in 1912 McCoy and Chapin discovered a bacterium in connexion with this disease and named it *Bacterium tularense*. This bacterium is a very small, rod-shaped organism. It appears to be encapsulated, is non-motile and is found in great numbers in the spleen of animals dead of the disease. The organism decolorizes with iodine in the Gram method, but stains well with gentian violet, carbol-thionin and carbol-fuchsin. It was first grown on an egg yolk medium.

Francis has recently succeeded in growing it on egg free media and has also isolated it from its original source on serum blood-agar, blood-agar, glucose blood-agar and on each of these media containing a

piece of fresh rabbit spleen. The disease, which was originally described by Pearse as occurring in man, is identical with that described by McCoy as occurring in rodents and is caused by the *Bacterium tularense*. In man as a rule it attacks the rural population and particularly workers in the field. It makes its appearance at the time of the year when rabbits are attacked and die of the disease and at a time when the fly, *Chrysops discalis*, is prevalent. It is supposed that the fly conveys the bacterium from the rabbit to man by a bite on an exposed part of the skin. The incubation period is under forty-eight hours and the onset of the disease is characterized by pain in lymphatic glands of the area affected. On the third day the site of the insect bite presents a black, necrotic patch, which soon sloughs, leaving a circular ulcer about one centimetre in diameter. The glands affected usually suppurate and require incision. Constitutional symptoms vary in intensity; generally there is fever, with prostration for the first week or two. Weakness persists during convalescence, which is slow and may take two or three months. It has been shown that several kinds of insect may transmit the disease. The rabbit louse, *Hæmodipsus ventricosus*, is capable of transmitting the infection from one rabbit to another in the laboratory. The blood-sucking fly, *Chrysops discalis*, which bites man, can transmit the disease from rabbit to rabbit in the laboratory. The bed bug, *Cimex lenticularius*, which bites human beings and rodents, is able to transmit the disease from white mice to white mice in the laboratory and in one case a mouse died from the disease five days after eating a bug that had been infected 165 days previously. The mouse louse, *Polyplax serratus*, can transmit the infection among white mice. The stable fly, *Stomoxys calcitrans*, is capable of transmitting the infection from one guinea-pig to another.

Dr. Edward Francis has recently reported seven cases of tularæmia that occurred in Millard County, Utah.[1] The diagnosis was confirmed in two of these instances by cultures of *Bacterium tularense* obtained from guinea-pigs that had been inoculated with blood from the patients. In the remaining five cultures were obtained from guinea-pigs inoculated with pus from the suppurating glands. Five of the seven patients were adult male farmers, one was a farmer's wife who worked in the field and one a little girl of seven. In all an insect bite and suppurating glands were present. One patient suffered a very severe infection; he was acutely ill for twenty-six days and died with signs of pneumonia at the apex of the right lung. No *post mortem* examination was made.

It would appear from further reports of this disease that the local manifestations of ulcer and lymph-adenitis are not essentially part of its development as an infective process.

Dr. G. C. Lake and Dr. Edward Francis have published an account of six instances of tularæmia occurring in laboratory workers.[2] All six men who contracted the disease, had been intimately connected with the laboratory investigations of tularæmia for over two years. Two were medical practitioners, one was a highly trained scientist and three were experienced laboratory workers. In determining the diagnosis of the disease as manifested in these six persons Drs. Lake and Francis considered the evidence under several headings. The onset in every instance was sudden. High fever was present. The temperature chart showed a remission on the third day, followed by an immediate rise. Subsequent lysis took about three weeks. Constitutional symptoms other than a feeling of great weakness were not pronounced, but convalescence extended over about two months and recovery took place without complications. The sera of all six patients were repeatedly tested by agglutination and complement fixation tests. A reaction occurred in every instance. The shortest interval between the time of onset of the disease and the testing of the serum was thirteen days and the longest interval was more than two years. The sera of four patients who were known to have had tularæmia and from whom Francis had isolated the bacterium, were used as controls. The sera of sixty-six patients suffering from non-febrile conditions were also tested for control purposes. The sera of two patients from the latter group showed some degree of reaction to the complement fixation test, but yielded no reaction in the agglutination test. Seven had been in contact with animals infected with tularæmia, but showed no reaction to either test. In one of the six tularæmia patients reported, the tests were of interest. His serum was tested twice by complement fixation and agglutination tests before the onset of his illness. On neither occasion was any reaction manifested. After his illness, however, definite reaction occurred to both tests on two occasions. The entire personnel (six) who were continuously employed in handling and dissecting rodents infected with *Bacterium tularense*, contracted the disease. These attacks developed between the seventh and the ninety-eighth days of such employment. One patient developed a second attack two years and five months after the first attack. Although other workers had access to the laboratory, they were not affected and no infection occurred among fresh stock animals kept in cages adjacent to those containing animals known to be infected. In all six patients there was no local lesion indicating the portal of entry and no involvement of lymphatic glands, except in the case of the patient who had two attacks, when there was a lesion on a finger and axillary adenitis with the second infection.

Drs. Lake and Francis endeavour to show that this is in harmony with observations on the disease in animals, both in natural and laboratory infections. There may occasionally be no local reaction at the site of infection and no resulting adenitis. It was also shown that infection can occur in the case of a guinea-pig when exudate from the spleen of an infected animal is placed on its skin.

The blood of three of the six patients was taken during the febrile stage and injected intra-peritoneally into guinea-pigs; no infection of the guinea-

[1] *The Journal of the American Medical Association*, April 8, 1922.

[2] "Public Health Reports (United States Public Health Services)," February 24, 1922.

pigs occurred. Drs. Lake and Francis regard this as evidence of the mildness of the attack.

The description of this hitherto unrecognized disease is important to Australia from several points of view. The disease is one that occurs in country districts in America in conditions that obtain very commonly in Australia. It has been shown that the infection can be transmitted by numerous insects. All these insects are found in Australia. The resemblance of the disease in its bubonic manifestations to plague is important. So far, no case of tularæmia has been recognized in Australia, but the possibility of its appearance must be borne in mind, particularly if a plague-like disease should appear in country districts. The type of the disease with no local lesion has so far only been recognized as appearing in laboratory workers who are in intimate contact wtih infected material. Manifestations of the disease occurring in rural workers have always been accompanied by local lesions and it is natural to suppose that any manifestation in Australia would show these characteristics.

UREA CONCENTRATION TEST.

THE determination of the functional activity of the kidneys is often of crucial importance and may have to be undertaken for a variety of reasons. The investigation may be necessary in order to discover whether any renal disturbance is present and, if present, to estimate the extent of the damage that the tissues of the kidneys have sustained. This is of importance from the point of view of treatment, when determining the diet suitable for a patient and of prognosis, not only in the case of kidney diseases, but also in the case of other illnesses when recovery depends on the possession of an efficient excretory system. Renal efficiency tests are, moreover, frequently called into use as a preliminary step to many surgical operations, more particularly when these involve the genito-urinary system. The quantitative estimation of albumin in the urine is not to be relied on, for in several forms of kidney disease no albuminuria may occur and, on the other hand, albumin is known to be present occasionally in healthy persons. The tests which have been used in regard to renal efficiency, are numerous. There is the determination of the volume ratio of day to night urine and the Mosenthal specific gravity variation test. The estimation of the blood-urea nitrogen is often of value, while the estimation of sodium chloride percentage, the diastase test, the estimation of the power of the kidney to concentrate uric acid from the blood and particularly the phenolsulphonephthalein test have been used with success. Lastly, there is the urea concentration test. In the normal individual on a mixed diet the blood contains from twelve to eighteen milligrammes of urea in each hundred cubic centimetres. During the progress of a kidney disease a stage is generally reached when the kidney is not able to deal with all the waste products of metabolism that are formed. These waste products become concentrated in the blood. A knowledge of the percentage of urea in the urine in such a case would not help, for it is quite possible to have a normal amount of urea excreted by a diseased kidney with a high concentration of urea in the blood. Estimation of blood urea content alone will not suffice, for this will often be found to be normal in a patient who has an advanced condition of renal insufficiency. Maclean and de Wesselow first introduced the urea concentration test, in which the urea present in the urine is estimated after ingestion of a measured dose of urea. This test, however, did not help very much to differentiate between cases where urea retention in the blood existed and cases where retention was absent. It was, however, noticed that patients with urea-blood retention passed relatively large quantities of urine with low urea concentration, while patients without retention passed smaller amounts with higher concentration.

Dr. Donald R. Black has recently published[1] the results of a series of tests made by him whereby he sought to compare the merits of the urea concentration test with other more commonly used tests for the estimation of renal function. Dr. Black confined his investigations to patients who were able to walk about, who had a definite vascular hypertension and whose blood urea nitrogen did not exceed twenty milligrammes in each hundred cubic centimetres. In order to make this test, the patient passes urine and immediately takes fifteen grammes of urea dissolved in one hundred cubic centimetres of water. The patient passes urine one hour and again two hours after taking the urea. The percentage of urea is calculated in both these specimens by the ordinary method of decomposing the urea with sodium hypobromite and measuring the volume of nitrogen evolved. If the percentage of urea exceeds 2%, the kidney may be considered as efficient; if below 2%, some disturbance is present and the lower the percentage the more serious is the lesion.

Dr. Black investigated the renal efficiency of fifteen patients, using the day and night ratio test, the Mosenthal specific gravity test, the sodium chloride percentage test, the blood sugar nitrogen test, the phenolsulphonephthalein test and the urea concentration test and has tabulated his results. Seven patients passed more than four hundred cubic centimetres of urine at night. Three had a definite fixation of specific gravity over two-hour periods. Five passed less than 1% of sodium chloride in twenty-four hours. None had over twenty milligrammes of urea nitrogen in each hundred cubic centimetres of blood. Seven excreted less than 50% of phenolsulphonephthalein in two hours and three showed the presence of 2% or more urea in the urine. From his observations Dr. Black concludes that the urea concentration test possesses some merit and is of opinion that in patients with a high blood pressure early loss of function on the part of the kidney may be discovered sooner with this test than with any of the others. It is well, however, to remember the advice of Mason, who stated that, in estimating kidney efficiency, it was necessary to use a series of different tests rather than to rely on any one test.

[1] *The American Journal of the Medical Sciences*, February, 1922.

Abstracts from Current Medical Literature.

DERMATOLOGY.

Adenoma Sebaceum Associated with Meningeal Nævus.

DAVID GREIG (*Edinburgh Medical Journal*, March, 1922) reports an instance of *adenoma sebaceum* in a schoolboy aged fourteen years. This patient gave a history of fits. On admission to hospital his face was pale and presented a papular, nævoid eruption over the middle third of the nose, the rash involved the naso-labial folds and extended outwards to the malar region with a symmetrical distribution, like an *acne rosacea*. It was composed of numerous small papules more or less acuminate and closely set together. Few papules were larger than a millet seed; some were pink or brownish-red; some were skin coloured; but most presented a capillary telangiectasis. A few papules, similar, but discrete, appeared on the chin and upper part of the neck. The patient underwent an operation for the meningeal nævus, which was treated by ligaturing the main vessels concerned. A complete cessation of the fits followed and a slight improvement in the appearance of the *adenoma sebaceum* was noticed. The author states that this improvement may have been due to the anæmia following operation. The striking point about the adenomatous condition is that it is congenital and usually associated with a minor degree of mental deficiency and with epileptiform convulsions. If the primary pathological change in *adenoma sebaceum* be a vascular one, then it is particularly suggestive that a cutaneous telangiectasis should accompany a meningeal venous angiectasis. Any statement with regard to the late appearance of *adenoma sebaceum* should be accepted only after the fullest investigation.

Lichen Planus.

SAMUEL FELDMAN (*Archives of Dermatology and Syphilology*, May, 1922) states that Montgomery in 1919 reported an instance of *lichen planus* in two brothers. He reviews the literature on the subject of family incidence of the condition. In all there were twenty-five cases reported, including his own, which occurred in husband and wife. From the extremely small number of cases of *lichen planus* in several members of the same family, he argues that it cannot be due to family predisposition. In the same article he says that *lichen planus* bears a pronounced resemblance to leprosy and syphilis. The fact that lichens are beneficially influenced by the administration of arsenic and mercury internally leads to the suspicion that there may be some remote relation between the causative factors in these diseases. The idea of a similar ætiology is immediately dismissed, however, when consideration is given to the evident infectious nature of one and the isolated character of the other. No instance has been reported of *lichen planus* in husband and wife, and the author believes that this extremely rare occurrence may help to throw some light on the hitherto unknown cause of *lichen planus*. In the case reported by the author the wife contracted *lichen planus* eight months after her husband. The individual lesions were strikingly similar, both in appearance and distribution. There was no family predisposition, as the husband and wife were not related and came from different parts of the world. The Wassermann test in each case yielded no reaction. In conclusion, the author suggests the possibility of infectious ætiology.

Treatment of Lupus.

K. A. HIBERG AND CARL WITH (*British Journal of Dermatitis and Syphilis*, March, 1922) state that Finsen and his pupils have proved that concentrated actinic light as a local treatment can cure lupus and that it acts almost as a specific. Jensen in particular, in his well-known work, has described the histological changes which take place during treatment with concentrated light. Latterly Reyn has shown that general light baths and more especially carbon arc-light baths, have an excellent effect on lupus. The percentage of cures is greatly increased when, in addition to the concentrated light as a local treatment, general applications of light are given. The way in which repair takes place seems to be partially dependent on the site of the lesion. In the very small lesions the epitheloid cells gradually lose their power of staining, as well as becoming disintegrated and gradually absorbed. The round-celled infiltration is only slightly developed. In the larger lesions it will also be found that the epitheloid cells stain badly and gradually break down, but the most conspicuous change is the considerable increase of round cells in the epitheloid tissue itself. This increase is far in excess of what is ordinarily met with and does not take place in the surrounding structures. In some cases also there is a connective tissue reaction, with the formation of many new cells, which are later on replaced by young connective tissue. This new tissue is rich in cells and shows the presence of isolated giant cells and some occasional round cells.

Suppurating and Cicatrizing Disease of the Scalp.

FRED WISE AND H. J. PARKHURST (*Archives of Dermatology and Syphilology*, December, 1921) record the fact that E. Hoffmann described a chronic inflammatory disease of the scalp, primarily peri-follicular, leading to suppuration and extensive undermining of the involved area. To this condition the name of *perifolliculitis capitis abscedens et suffodiens* was given. This patient was shown before the Berlin Dermatological Society in November, 1902. He was a man of twenty-five and had been afflicted for a year. On the occiput were many hazel-nut-sized, pale, hemispherical elevations, hairless or covered at the edges with sparse hair stumps. Pressure on these elevations caused an exudation of pus and a probe could be inserted up to four or five centimetres into each of them. Besides these closely associated tumours with smooth, pale, greyish-red surfaces, which gave the scalp a mammelated appearance, there were a few disseminated pustules and crusts, pierced by hairs and isolated small scars. Healing resulted in further scar formation and was said to be hastened by the application of a 10% sulphur zinc paste. Three further examples of this disease are repeated. All of them have a characteristic pathological picture. It is a severe infection of the occipital portion of the scalp, consisting of many large and small suppurating nodules, which become connected by burrowing, thereby undermining a large part of the scalp. They are difficult to control by treatment and leave on healing a flat, scarred alopecia in irregular spots similar to pseudo-pelade.

Itching in Syphilis.

WALTER J. HYGHMAN (*Archives of Dermatology and Syphilology*, January, 1922) calls attention to the diagnostic danger of unreservedly accepting the statement that itching lesions are non-syphilitic. He states that, in searching the literature on the subject, nothing was found beyond the conventionally known facts that the small papular secondary syphiloderm or syphilitic lichen and its derivatives, such as syphilitic acne, may itch, particularly so in the negro, and that syphilides are more likely to be pruriginous in blacks than in whites. One author, however, in discussing pruritus in syphilis, states that itching is particularly apt to occur on the scalp, scrotum, perineum and legs and that very rarely a syphilide may be intensely pruritic. In the instances reported by the author he calls attention to the marked pruritus and the resemblance of one eruption to a generalized, exfoliative dermatitis. Hebra has also noted a case of syphilis resembling an exfoliative dermatitis. The itching stopped in each case a few hours after the first injection of mercury.

Subcutaneous Fibroid Syphiloma.

HOWARD FOX (*Archives of Dermatology and Syphilology*, February, 1922) describes a subcutaneous fibroid syphiloma as occurring in a negress. The lesions consisted of painless, subcutaneous nodules of cartilaginous hardness, situated along the ulnar border of each forearm. The overlying skin was normal in appearance and freely movable over the nodules. The lesions over the knees were less firm than those on the arms. Nothing abnormal was seen in a skiagram of the adjacent bones and the lesions had no apparent relation to the bursæ. Several reports are made of patients suffering from a similar condition. Histologically the nodules consisted of a dense mass of fibrous tissue, surrounded by and including numerous foci of chronic inflammatory small-celled infiltration.

RADIOLOGY.

Reduced Bone Density.

D. B. PHEMISTER (*American Journal of Roentgenology*, July, 1921) contributes an article on a series of bone studies in relation to density reduction in certain diseases. This reduction is due to either a retarded deposit of bone, as in rickets and osteomalacia, or to an excessive bone absorption accompanying disease or injury. Recent research shows that there is no specific osteoclast cell; certain cells possessing the power of bone absorption, *e.g.*, fibroblasts and endothelial cells, may take on this function. In bone infections there are four processes by which reduction in density occurs. Firstly, destruction of dead bone at the seat of greatest inflammatory reaction; secondly, local destruction of living bone; thirdly, rarefying osteitis about the area of complete bone destruction; fourthly, there is a regional atrophy from disuse. The amount of each varies with the nature and severity of the inflammatory process. In osteomyelitis the process may be in existence for from six to fifteen days before X-rays disclose any signs of necrosis. Living bone is absorbed about the dead bone, helping in sequestration and cavity formation. This process is known as caries and the absorption is produced by granulation tissues, while a rarefying osteitis is produced from the extension of the inflammatory process to the surrounding tissues. Regional atrophy occurs from disuse and depends on the severity and duration of the disability. Tuberculosis produces localized osteitis and rarely osteo-myelitis. In this disease the regional atrophy is marked. Syphilis produces gummatous caries with irregular areas of lessened density and sequestration is but rarely noted. In tumours the lessened density is due to the breaking down of the bone tissue by cellular activity and there is but little tendency to new bone formation. Usually metastatic carcinoma commences in the interior of the bone; giant-celled sarcoma is non-malignant and it causes erosion of bone from pressure, with little tendency to new bone formation.

Abnormalities of Caecum.

R. A. PAYNE AND F. C. TRAHIR (*American Journal of Roentgenology*, November, 1921) contribute a paper on developmental rests in the caecum and ascending colon, with reference to their radiographic diagnosis. In considering the position of the caecum, it is necessary to consider the four processes or stages it goes through in development, *viz.*, migration, rotation, descent and fixation. In the fifth week embryo, the primitive gut is in the mid-line and attached to the umbilicus with caecum showing as a bud on the caudal portion of the gut. As the liver rapidly increases in size the gut is pushed from the caelom into the umbilicus and the small gut is thrown into folds. With increase of the size of the body cavity, the gut returns to that cavity. The small gut is the first to return and later the large gut; the former fills the upper right quadrant and enters the caecum from the right. With the process of rotation, the small gut comes to a central position and finally enters the caecum from the left. In the later months of pregnancy and the first month after birth, the caecum and ileo-caecal valve are carried into the right iliac region and fusion of the various mesenteries occurs. The caecum may be arrested at any point along its course of travel and its position and degree of fixation may readily be demonstrated by skiagraphic examination. When the process of rotation, descent and fusion have been excessive, the proptosed, mobile caecum with irregular band formation is seen. The commonest band is that between the right kidney and the ascending colon. Dragging on this band causes that mobility of the kidney so often seen in cases of mobile caecum. Arrest of the appendix, with continued descent of the caecum, accounts for many of the straight appendices fixed in the liver region with practically a suspension of the caecum.

Deep Cancer Radiation.

H. K. WARD (*The Lancet*, February 25, 1922) describes his personal experiences of the treatment of cancer as carried out at the Erlangen Frauenklinik. The measurement of dosage is rather a laborious process and is carried out by means of the improved iontoquantimeter. The tubes are all calibrated at intervals and the actual applications are made by time. Only a small percentage of the rays generated are effective at the deeper levels and this is referred to as the percentage dosage at ten centimetres depth. The more penetrating the rays, the greater is the percentage dose. The softer rays are cut off by a 0.5 millimetre filter of pure zinc, which is equal to about twelve millimetres of aluminium. Greater filtration than this does not improve the percentage dose, as such filtered rays are practically homogeneous. Wide radiation produces greater percentage dose, due, probably, to the production of secondary rays in the tissues themselves. Seitz and Wintz lay down an optimum dosage for various conditions. They consider the erythema dosage as 100 and give 34 as a sterilization dose, 110 as a lethal cancer dose, 80 as a sarcoma dose and so on. Under-dosage greatly stimulates cancer growth and must be avoided, while about a 35% over-dosage will produce rectal irritation and intestinal ulceration. Fibromyomata yield rapidly to treatment, the hæmorrhage disappearing at once with later dwindling of the tumour. The dosage is given in one sitting and the Erlangen school has given up the simultaneous application of radium and X-rays in treating malignant disease. Three erythema doses are given through six ports of entry at the one sitting in cervical disease and truly remarkable results are reported. Marked destruction of red cells and lymphocytes follows radiation, but the blood recovers in six weeks and the dosage can then be repeated. In early cases cure can be expected, but when cachexia is present or metastases exist, no such result is looked for; in fact, such conditions generally contraindicate radiation.

Effects of Soft X-Rays.

W. NAKAHARA AND J. B. MURPHY, of the Rockefeller Institute (*The Journal of Experimental Medicine*, April 1, 1922), contribute a paper on the biological action of small doses of low frequency rays. They had previously attempted to compare the biological action of soft or low frequency rays with that of hard or high frequency rays, but they found that the present measuring devices were not efficient and the studies of little value. They were, however, able to establish one point of value, *viz.*, that with softer rays it is possible to induce an apparent stimulation of the lymphoid cells, which is preceded by only a short and transitory period of depression; with harder rays this stimulation is less pronounced or absent. For the purpose of producing very soft rays a special water-cooled tube, with a thin, glass window, was designed and this window allowed the passage of rays which are usually held back by the glass wall of the tube. The rays used were very soft, back-up spark being only 1.75 centimetres and the animals were exposed to eleven milliampères for one minute at a distance of about 27.5 centimetres. The animals treated were killed after twenty-four hours, four days, seven days and ten days and the spleen, lymphatic glands, bone marrow, thymus, thyreoid, liver, kidney, suprarenal glands, ovaries and testes were taken for histological examination. The authors found that, with a suitable dosage, a stimulation of lymphocytes and lymphoid tissues is produced in the several organs with only slight transitory depression. With larger doses a more marked and lasting depression occurs and there is no subsequent stimulation. Mice treated in this way showed a marked resistance to cancer implantation.

X-Ray Dermatitis.

MARY ARNOLD SNOW (*Medical Record*, November 26 and December 3, 1921) deals with the deleterious effects of radium and X-rays on the skin. Lack of adequate protective apparatus and inefficient filters are the most important factors in the production of a dermatitis, while the strength of the radiation, cumulative effect and dosage have all to receive careful attention. The whole tube should be enclosed in a ray-proof box and care must be taken to avoid secondary radiation from metallic articles in the clothing. The skin surrounding an affected area must be well protected by opaque material and it is advisable to use a combined metal and leather filter. The author relies on the various mathematical formulæ for calculating the skin dosage and places little reliance on pastilles. Great care is necessary in treating areas of lessened vitality.

British Medical Association News.

SCIENTIFIC.

A MEETING of the New South Wales Branch of the British Medical Association was held at the B.M.A. Building, 30-34, Elizabeth Street, Sydney, on May 26, 1922, DR. T. W. LIPSCOMB, the President, in the chair.

Rupture of the Uterus.

DR. R. I. FURBER, D.S.O., read the report of a case of rupture of the uterus (see page 11).

DR. CONSTANCE E. D'ARCY thanked Dr. Furber for his interesting communication. She held that rupture of the uterus was a rare accident which was always worth recording. She spoke of her own experience of two cases of rupture of the uterus. In the first the rupture had taken place through the scar of a previously performed Cæsarean section. The patient had been attended by an untrained midwife, who had allowed labour to proceed all day without sending for assistance. Eventually, when it was evident that something had gone wrong, she had called in a medical practitioner, who had sent the patient into hospital. Rapid hysterectomy had been performed. It had been found that there were dense adhesions between the old uterine scar and the anterior wall of the abdomen. These adhesions had limited the amount of hæmorrhage. Some blood had tracked up between the planes of the abdominal muscles. The fœtus was dead. The patient made a good recovery.

The second patient was a multipara who had had three easy labours. The labour on the fourth occasion lasted for two days. The medical practitioner in charge had not recognized that the fœtus was hydrocephalic. At the end of the second day the uterus had ruptured. One and a half hours later she had been admitted to the Royal Hospital for Women. Hysterectomy had been performed. There had been a very large amount of blood in the pelvis. The rent had been found in the lower uterine segment and Dr. D'Arcy thought that the uterine artery had been torn across. The fœtus had still been *in utero*. The patient had died a half an hour later.

Dr. D'Arcy also referred to incidents of partial rupture of the uterus. One patient had a contracted pelvis with a *conjugata vera* of 6.25 centimetres (3½ inches). There had been strong labour pains and the medical practitioner in charge had given one cubic centimetre of pituitary extract. The patient had been sent to the Royal Hospital for Women. Chloroform had been administered for the purpose of stopping the tetanic spasms of the uterus. The abdomen had then been opened and a small quantity of blood had been found in the cavity. A small rent low down in the anterior wall of the uterus had been found. The peritoneal surface had given way first. The rent had been sewn up in the ordinary way and the patient had made a happy recovery.

Dr. D'Arcy regarded these histories as lessens to illustrate the results of lamentable midwifery. Medical students and nurses needed better training in obstetrics to prevent these awful catastrophes.

DR. A. J. GIBSON congratulated Dr. Furber on the excellent result he had obtained. He spoke of the dangers attending the performance of low Cæsarean section. In his opinion, this operation was unjustifiable, more particularly because high Cæsarean section was more easily performed and was associated with very little bleeding. He detailed some instances of rupture of the uterus during miscarriage. In the first patient the miscarriage had been incomplete. In the attempt to remove the placenta instrumentally the uterus had been ruptured. In the second patient a similar accident had occurred. Dr. Gibson held that when it was necessary to curette the inside of the uterus or to remove its contents after miscarriage, the best instrument was the finger, but even this instrument should be used with great care.

DR. T. W. LIPSCOMB thanked Dr. Furber for his instructive paper. He agreed with Dr. D'Arcy that it was desirable to report every case of rupture of the uterus. He gave some details of a case of the rupture of the uterus in his own experience. The patient had had two previous labours. In the third the child had been born without interference and without difficulty. There had been delay in the delivery of the placenta. As the pulse-rate was becoming rapid, the hand had been inserted. The hand slipped through a hole in the uterus. The patient was admitted to a private hospital, where transfusion and hysterectomy had been performed. The placenta had been found in the peritoneal cavity. The patient recovered.

In his reply, DR. FURBER stated that he agreed with Dr. Gibson concerning the danger of ovum forceps. He pointed out, however, that the finger could be a dangerous instrument when it was unskilfully used. He illustrated this danger by recounting the details of a particularly unskilled interference. In conclusion, he pleaded for better instruction of the student in obstetrics and gynæcology, even if this involved the sacrifice of some of the time at present devoted to surgical and medical studies.

Deep X-Ray Therapy.

DR. E. H. MOLESWORTH read a paper entitled "X-Ray Therapy of Malignant Disease" (see page 1).

DR. H. R. SEAR uttered a word of warning against the expenditure of a large amount of money on a high-tension transformer or duplex coil until it could be shown definitely which of the two types of apparatus was the more satisfactory for the work with which Dr. Molesworth had dealt in his paper.

DR. J. G. EDWARDS thanked Dr. Molesworth for the clear manner in which he had put forward the modern views on deep radiation therapy. He considered that Dr. Molesworth had been most moderate in his claims. In regard to the apparatus designed by Dr. Molesworth and Mr. Scott, he was very doubtful as to the accuracy of the measuring devices for obtaining the secondary voltage; the sphere gap exhibited was certainly below the standard of the Society of Engineers, but Mr. Scott had stated that the spheres exhibited were not to be used in the finished machine. The open core induction coil or transformer was not such a perfect and efficient machine as the closed core interrupter-less transformer of the Victor-Snook type. Professor Dessauer had returned from his visit to America and had altered his apparatus to the closed core type. Dr. Coolidge's new high-voltage tube would stand 200 kilovolts with a current of eight milliampères for many hundred hours and had been tested for 150 hours at 300 kilovolts and with five milliampères of current. Dr. Edwards was also doubtful as to the capacity of the secondary rectifying device; it appeared to have very short cross-arms, with insufficient spacing between the arms. The arms of the Victor-Snook machine were twice the length of those exhibited and were spaced 82 centimetres (32 inches) apart. He also remarked that he did not think there was any chance of electrocution from an interrupter-less transformer on resistance control. Moreover, it would be a very simple matter to insert a cut-out switch to disconnect the primary current, when the secondary current exceeded ten milliampères.

DR. G. R. HAMILTON pointed out that, apart from any question of the ability of X-rays to cure malignant disease, this form of treatment was extremely valuable in that it afforded in many cases an intense relief from pain. Every radio-therapist was familiar with the gratification of patients on this account. Dr. Hamilton pleaded for the application of X-rays before and after operation for the removal of malignant neoplasms and for more cooperation with the surgeon. In referring to his experience at the London Hospital he pointed out that a dose of 4 "B" through a filter of 1.5 millimetres of aluminium was usual and that six such doses were often given for breast cancers. He had applied a dose of 15 "B" through a filter in the case of simple secondary nodules. At the London Hospital the pastilles were placed above the filter, one reason being that the pastille was not a true recorder of filtered rays. In referring to the measurement of the erythema dose he pointed out that Sabouraud pastilles varied very greatly in Sydney, owing to the climatic changes on the way out from England and France. The differences sometimes amounted to 20%. It was therefore necessary to be very careful when using Sabouraud pastilles. One firm returned

a few of each new batch of pastilles to check errors due to climatic changes. He had noted that at the McGill University in Montreal and at the American clinics, including the Vanderbilt and Mayo clinics, they had discarded the use of the pastille on that account. Dr. Hamilton extolled the wonderful equipment at the Toronto General Hospital. He referred briefly to the method of measurements of the erythema dose devised by Remer, McKee and Shearer. In conclusion, he congratulated Dr. Molesworth on his admirable paper.

DR. B. J. M. HARRISON complimented Dr. Molesworth on his paper, in the course of which he had covered a very wide area. Dr. Molesworth had referred to a practitioner who had invested much money on modern machinery. He admitted that he was that practitioner. He had, however, not undertaken this expenditure without very careful thought. There was considerable difficulty in obtaining information on deep therapy. He thought that the best reports were those from Stockholm, which had been published in a circular announcing a new journal to be called *Acta Radiologica*. Important work had been carried out by Wintz and Seitz at Erlangen and was gaining recognition, especially in Germany. The first matter of importance for testing the value of the new therapy was to secure reliable apparatus. In Australia they were a long way from the centres of research. It therefore appeared to him to be advisable to obtain a machine made by the most expert firm. He pointed out that the open core apparatus could be imported for about £1,000 from Germany and an English apparatus might be obtained for £800. It was, however, impossible to estimate the amount of money that would have to be spent before either of these apparatus could be installed in working order. The Victor Company, which was a branch of the General Electric Company, undertook to supply and install in perfect working order their closed core transformer apparatus for £2,800. It was significant that when Professor Dessauer went to the United States of America he was an advocate of the open core transformer. He had returned to Germany an advocate of the closed core transformer. Dr. Harrison had obtained other evidence of reliability of this apparatus. Professor Laby, of the Melbourne University, had recommended the General Electric Company's machine. In the next place, he pointed out that there was a fallacy in regard to Morton's spark gap rectifier. This device was supposed to pick up the peak of the wave and thus to cut out all soft rays. It was physically impossible to effect this. Morton's rectifier only reduced the amount of soft rays. There were apparently many questions in connexion with these machines which could be decided only by physicists. The fault he had to find with Dr. Molesworth was that, in his enthusiastic description of the apparatus he was about to install, he had not specified the exact method which he intended to adopt. Consequently, it would be necessary to measure the dose as delivered to the tissues to be irradiated. He found that at Erlangen they had discarded the use of the Sabouraud pastille. The use of the iontoquantimeter necessitated three millimetres of lead encasement, which was an encumbrance. Moreover, if radium were in the room or even if it had been in the room within the past few weeks, the readings of the iontoquantimeter were upset. The instrument was too sensitive for anyone other than a physicist to use. Dr. Harrison pointed out that as each type of apparatus varied a tabulated dosage would be unreliable. It therefore would be necessary to standardize each apparatus and each tube other than the Coolidge used. He thought that the matter was bristling with difficulties and he anticipated that six months would elapse before Dr. Molesworth would be able to measure the amount of penetrating rays he was employing. He was convinced that the new apparatus would prove itself of very great value, notwithstanding the evident over-enthusiasm which existed at present in its favour.

DR. R. I. FURBER, D.S.O., speaking as a gynæcologist, viewed the claim made on behalf of deep X-ray therapy with grave alarm, but hoped that vaginal plastic operations at least would have to be done with a knife for some time yet. It would be a great relief to gynæcologists to learn of such a successful method of attack on carcinoma of the cervix. The evidence, however, appeared to him to be unconvincing. He referred to a patient with a large carcinoma of the cervix. There had been pain and bleeding for about a year. After four applications of X-rays by Dr. Edwards the pain had gone, the bleeding had stopped and the size of the tumour appeared to have decreased. It was too early to claim that a cure had been effected. He did not think that X-rays should be used for uterine fibroids because hysterectomy had proved itself so successful.

DR. H. BULLOCK took up the defence of surgery, which he held Dr. Molesworth had attacked. He was inclined to the opinion that those who possessed a large X-ray apparatus, could not see the two sides of the question. He thought that Dr. Molesworth had been immoderate in his claims, whereas Dr. Hamilton, who had recently returned from European centres, had shown some degree of moderation. It appeared to him that the cooperation of the radiologists with the surgeons was eminently needed. Until recent years radio-therapy had been carried out to a large extent by unqualified people. Now that the profeession was taking up this work, every effort should be made to coordinate the investigations into the whole question of cancer. Dr. Bullock referred to some of the surprises of the operative treatment of malignant disease. He spoke of a patient who had had a melanotic sarcoma of the abdomen of very large size with extensive involvement of the glands of the groin. Eighteen months after its removal the patient was working and was apparently well. The specimen was in the Sydney Hospital Museum. About six years ago he had had a patient who had been from surgeon to surgeon in Adelaide and in Melbourne. No one had attempted to remove the rodent cancer, which had started on his face and had ulcerated into the mouth cavity, involving the mandible and cheek. Dr. Bullock, in desperation, had removed half of his face, half of his neck, half his mandible and half of his tongue. At the time of speaking the man was working as a gardener in apparently good health.

He mentioned these cases in order to point out that the unexpected was always happening in the surgical treatment of cancer, even without the aid of X-rays. The same would also happen in the treatment of malignant growths with X-rays without surgical aid in rare cases. Surgeons were expected to be acquainted with the pathology and spread of malignant growths. Radiologists should also bear in mind that a malignant growth did not confine itself to its point of origin.

He stated that radium appeared to make malignant tumours grow. He thought that it was a ridiculous idea for surgery and radiology to enter into competition with one another. He was satisfied that X-rays and radium did definite harm in cancer involving bone or cartilage.

DR. T. W. LIPSCOMB thanked Dr. Molesworth for his admirable paper. They had to recognize that Dr. Molesworth was an enthusiast and to make due allowance for the fact. After all, he had spoken of the application of large doses of X-rays in two case only. In the second he had been forced to admit that amputation had been necessary, notwithstanding the X-ray treatment. The claims that had been made, were not yet proven. It appeared to him that all they were justified in assuming so far was that X-rays were additional means of helping in the treatment of a dreadful disease.

In his reply, DR. MOLESWORTH stated that he had not carried out curettage of rodent cancers before X-ray treatment. When the rodent tumour possessed certain characters or did not respond to X-ray treatment he invariably recommended surgical removal.

A short passage of arms occurred when he took up Dr. Hamilton's statement that he applied 4 "B" as a dose through one and a half millimetres of aluminium. At first he issued a challenge to Dr. Hamilton to apply this dose to himself. Dr. Hamilton, however, pointed out that they were probably as cross purposes. The measurement "B," according to Dr. Hamilton, implied an erythema dose without the interposition of a filter. The changes in the Sabouraud pastille when the rays had passed through an aluminium filter were different from those when the rays fell on the pastille directly.

Dr. Molesworth said that he was surprised to learn that a claim had been made that Professor Dessauer had been converted to the closed core type of transformer. It ap-

peared to him, however, that the open core transformer was much safer and he was convinced that there was a real danger of electrocution with the closed core type of transformer. He did not think that it was worth while investing the larger amount of money until the claims made for the apparatus had been proved.

In regard to the measurement of dosage, he recognized that the Sabouraud pastille would have to be abandoned. He thought that the measurement of the dose of rays at a depth would have to be determined by experiment. This could be done with a lump of meat or with a vessel containing water. He was not prepared at the present time to enter into a controversy in regard to the relative value of the two apparatus. The apparatus he possessed was simple and relatively cheap. It had been constructed for him by Mr. J. L. Scott, of Sydney. The coils had been tested and had been found to give ten or more milliampères with a high voltage.

In reply to Dr. Bullock, he stated that he had made no attack on surgeons or surgery. He had merely quoted the published opinions of some continental authorities for what they were worth. At the same time, he claimed that, as the results of surgical treatment of cancer were admittedly very poor, it was highly important that the profession should consider this new method of treatment. In regard to Dr. Bullock's remarks concerning the effects of X-rays and radium on growth involving bone and cartilage, he recognized that this had been true of low penetrating X-rays, but he suggested that this was no longer true with the use of high penetrating rays. He heartily agreed with the suggestion that there should be cooperation between surgeons and radiologists and that the time had arrived when any jealousy that might exist between them, should disappear.

NOMINATIONS AND ELECTIONS.

THE undermentioned have been elected as members of the New South Wales Branch of the British Medical Association:

DE BURGH, HUGO MACARTNEY, M.B., Ch.M., 1922 (Univ. Sydney), Royal Prince Alfred Hospital, Camperdown.

DICKSON, JOSEPH SYDNEY, L.R.C.P., L.R.C.S. (Edin.), L.R.F.P.S. (Glasg.), 1915, 61, Raglan Street, Mosman.

EVANS, EDWARD FRANCIS, M.B., Ch.M., 1922 (Univ. Sydney), Sydney Hospital.

FENNER, NORMAN EDGAR, M.B., Ch.M., 1922 (Univ. Sydney), Royal Prince Alfred Hospital, Camperdown.

GENGE, FRANCIS HARRISON, M.B., Ch.M., 1921 (Univ. Sydney), Burlington Road, Homebush.

HILLIARD, ERIC THEODORE, M.B., Ch.M., 1922 (Univ. Sydney), Mental Hospital, Parramatta.

LITTLE, DUDLEY WILLIAM, M.B., Ch.M., 1921 (Univ. Sydney), Morgan Street, Petersham.

MATHEWS, WILLIAM ROBERT, L.R.C.P., London, 1892; M.R.C.S., Eng., 1892, Barellan.

OWEN, ALLAN CAMERON, M.B., Ch.B., 1902 (Univ. Edin.), Challis Avenue, Potts Point.

PURCHAS, ARTHUR JOHN MAURICE, M.B., Ch.M., 1922 (Univ. Sydney), Sydney Hospital.

ROSENTHAL, CECIL PHILLIP, M.B., 1916 (Univ. Sydney), Bundarra.

THE undermentioned have been elected as members of the South Australian Branch of the British Medical Association:

FINLAYSON, CONSTANCE ALICE, M.B., B.S., 1922 (Univ. Melbourne), Adelaide Hospital, Adelaide.

MOCATTA, ANNIE MILDRED, M.B., B.S., 1922 (Univ. Melbourne), "Telowery," Church Terrace, North Walkerville.

WHITE, ALAN HUBERT, M.B., B.S., 1921 (Univ. Adelaide), Lameroo.

Public Health.

THE PLAGUE OUTBREAK.

THE following information has been culled from the Plague Bulletins, Nos. 44, 45, 46 and 47, issued by the Department of Health for the Commonwealth between May 19 and June 9, 1922:

Plague in Rodents.

Reference is made to the discovery of one plague-infected mouse in Brisbane during the week ended April 29, 1922. From that date up to June 3 no infected rodent was discovered in Queensland.

In Sydney twenty-six infected rodents were discovered during the four weeks ended May 27, 1922. Notwithstanding extensive rat-trapping operations in all parts of Australia, no other animals were discovered during the periods covered by the four reports.

Plague in Human Beings.

On May 16 it was reported that a man, aged twenty-seven years, residing in Glebe, New South Wales, had been admitted to the Coast Hospital a fortnight before and that the diagnosis of plague had been confirmed. On May 19 a women, aged sixty-one years, was found to be suffering from plague. Her place of residence was in Paddington and she had been admitted on May 17 to the Coast Hospital. On June 7, a female patient, aged seventy years, who had been admitted from Paddington to the Coast Hospital on June 4, was found to be suffering from plague.

One patient died of plague on May 12, 1922. No other human infections occurred during the period under review.

General.

Information is given concerning the control exercised over merchandise passing between Queensland and New South Wales. During February, 1922, forty-nine packages were rejected at Wallangarra, where merchandise is transferred from truck to truck, on account of non-compliance of regulations. During March and April fourteen cases of fruit were similarly rejected. Between February 20 and April 28, 1922, forty-seven rodents were obtained from railway trucks at Wallangarra, while considerable numbers of mice were seen in trucks of chaff. None of these animals appeared to be ill and no evidence of plague was discovered in those subjected to examination.

A progress report is issued by the Metropolitan Joint Health Board of Brisbane, covering the period between March 20 and April 22, 1922. It would appear from the report that the sanitary and other measures prescribed were being carried out in a satisfactory manner. Since the appointment of the Board seventy-seven prosecutions had been intiated for breaches of the regulations. A conviction was secured in each case.

The investigations into the prevalence of fleas, including the classification of the various species, has been continued. Some results of these investigations are published in the "Bulletins."

Obituary.

JOHN WOLLARD PAYNE.

DEEP regret has been occasioned by the death of Dr. John Wollard Payne, of Devonport, Tasmania. He had been in indifferent health for a time and sought a change of air and scene in Hobart. A few days after he had left his home, his condition became threatening and on May 17, 1922, he died.

John Wollard Payne was the son of a Wesleyan minister. He was born on October 27, 1853, at Wellingborough, Northamptonshire. He was educated at Kingwood School, Bath, and after leaving school he became apprenticed to a chemist and druggist in Ticehurst, Sussex. His three years of apprenticeship terminated in 1872, but he extended his service with the pharmacist for a further two years, when he passed an examination enabling him to be

registered as a medical student. He entered the Medical School at the London Hospital in 1876 and three years later obtained the licentiate of the Society of Apothecaries of London. He then became part-time assistant to a medical practitioner in Islington, in the north of London. During this time he continued his studies at the London Hospital. In 1882 he obtained the qualification of Member of the Royal College of Surgeons of England. He then served for two years as assistant to a medical practitioner in Yorkshire. In 1884 he obtained a position as ship's surgeon and remained in this branch of practice until 1886. He was on the steamships *France* and *Canada*, running between Liverpool and New York and London and New York respectively. Later he was surgeon on board the steamship *City of Agra* on a voyage to Melbourne. In September, 1886, he acted as *locum tenens* to the late Dr. Parks, of Latrobe, Tasmania. In 1887 he married. During the following fifteen years he conducted his extensive practice from Latrobe, but early in the present century he moved to Devonport, at which town he resided until his death. He was one of the founders of the Devon Hospital.

In the wide district of Devonport and Latrobe he earned the reputation of being a skilled practitioner and a real friend to everyone for miles around. His genial nature, his fatherliness and his genuine interest in the welfare of all his patients endeared him in practically every home. Outside his professional duties he was held in the highest regard. He was a Justice of the Peace at Latrobe and Devonport and a Health Officer for the district of Devonport. He belonged to two Masonic Lodges. The people of Devonport are much the poorer without their trusted and beloved old doctor.

The sympathy of his colleagues is extended to his widow and his family. One of his three sons was killed in France. Another son is a medical practitioner.

PERCIVAL BOLLEN.

IT is with great regret that we have to record the death of Dr. Percival Bollen, of Semaphore, South Australia. Dr. Bollen died on June 19, 1922.

WILLIAM FREDERICK LITCHFIELD.

IT is with the deepest regret that we have to announce the death of Dr. William Frederick Litchfield, which occurred suddenly on June 22, 1922, at Sydney.

Naval and Military.

APPOINTMENTS.

THE following information has been published in the *Commonwealth of Australia Gazette*, Nos. 5, 45, 46 and 47, of January 19, May 18, 25 and June 1, 1922:

Permanent Naval Forces of the Commonwealth.

SEA-GOING FORCES.

Promotion.

SURGEON-LIEUTENANT-COMMANDER LEONARD DARBY, M.B., Ch.B., is promoted to the rank of Surgeon-Commander (provisional), dated 1st April, 1922.

Resignation.

THE resignation of EDWARD THOMAS BRENNAN, M.B., Ch.B., D.S.O., M.C., of his appointment as Surgeon-Lieutenant (on probation) is accepted, dated 14th April, 1922.

Appointment.

JOHN JOSEPH LAURENCE MCDONALD, L.R.C.P., L.R.C.S., is appointed Surgeon-Lieutenant (on probation), dated 1st May, 1922.

Citizen Forces of the Commonwealth.

ROYAL AUSTRALIAN NAVAL RESERVE.

Promotion.

SURGEON-LIEUTENANT A. W. WEIHEN, M.A., M.D. (Retired List), is promoted to the rank of Surgeon-Lieutenant-Commander (Retired List), dated 1st March, 1921.

Australian Military Forces.

FIRST MILITARY DISTRICT.

Reserve of Officers.

CAPTAIN R. H. LEEDS is transferred to the Reserve of Officers, Second Military District, 1st May, 1922.

CAPTAIN N. J. MACKAY, M.C., is transferred from the Reserve of Officers, Third Military District, 1st May, 1922.

Retired List.

THE notification respecting the removal of the name of HONORARY COLONEL J. AHEARNE, V.D., from the Retired List, which appeared in Executive Minute No. 83/1922, promulgated in *Commonwealth of Australia Gazette*, No. 26, dated 23rd March, 1922, is cancelled.

SECOND MILITARY DISTRICT.

Reserve of Officers.

HONORARY CAPTAIN J. P. MAJOR is transferred to the Reserve of Officers, Third Military District, 1st May, 1922.

CAPTAIN R. H. LEEDS is transferred from the Reserve of Officers, First Military District, 1st May, 1922.

LIEUTENANT-COLONEL A. F. JOLLEY, MAJOR G. S. ROBINSON, M.C., and HONORARY CAPTAINS F. H. LOONEY and M. MATENSON are transferred from the Reserve of Officers, Third Military District, 1st May, 1922.

COLONEL T. M. MARTIN, C.M.G., is placed on the Retired List, with permission to retain his rank and wear the prescribed uniform, 1st January, 1922. (This amends the notification respecting this officer which appeared in Executive Minute No. 24/1922, promulgated in *Commonwealth of Australia Gazette*, No. 8, dated 26th January, 1922.)

Retired List.

THE resignation of MAJOR J. MARSHALL of his commission is accepted, 1st May, 1922.

THIRD MILITARY DISTRICT.

Australian Army Medical Corps.

CAPTAIN (provisionally) W. J. P. FLANAGAN is transferred to the Reserve of Officers and to be Honorary Captain, 21st April, 1922.

Reserve of Officers.

CAPTAIN N. J. MACKAY, M.C., is transferred to the Reserve of Officers, First Military District, 1st May, 1922.

LIEUTENANT-COLONEL A. F. JOLLEY, MAJOR G. S. ROBINSON, M.C., and HONORARY CAPTAINS F. H. LOONEY and M. MATENSON are transferred to the Reserve of Officers, Second Military District, 1st May, 1922.

FOURTH MILITARY DISTRICT.

Australian Army Medical Corps.

CAPTAIN R. H. PULLEINE is transferred to the Reserve of Officers and to be Honorary Major, 1st July, 1920. (This amends the notification respecting this officer which appeared in Executive Minute No. 571/1920, promulgated in *Commonwealth of Australia Gazette*, No. 106, dated 2nd December, 1920.)

FIFTH MILITARY DISTRICT.

Reserve of Officers.

MAJOR W. C. SAWERS, D.S.O., and HONORARY CAPTAINS E. ROGERSON and D. G. ROBERTSON are transferred to the Reserve of Officers, Third Military District, 1st May, 1922.

SIXTH MILITARY DISTRICT.

Reserve of Officers.

THE resignation of HONORARY CAPTAIN A. H. CLARKE of his commission is accepted, 31st May, 1922.

To be Major—CAPTAIN C. MATTEI, 1st May, 1922.

Correspondence.

RESEARCH ON DENGUE AND "X DISEASE."

SIR: Though it may seem a small matter, yet I am sufficiently vain to ask you to correct the impression conveyed by Dr. Purdy's letter *re* dengue and "X disease." He says: "Drs. Cleland and Ferguson, by their work on insect-borne diseases, more especially 'X disease' and dengue." . . .

The whole of the dengue work was carried out by Dr. Cleland and myself, Dr. MacDonald assisting us in the clinical records. The early part of the "X disease" work, including its transmission to monkeys, was done also by Cleland and myself. This may be proved by anyone by referring to the literature.

I have no doubt that Dr. Purdy's statement was but a slip and that he won't mind me correcting it.

Yours, etc.,

BURTON BRADLEY.

203, Macquarie Street, Sydney.
June 20, 1922.

Proceedings of the Australian Medical Boards.

VICTORIA.

THE undermentioned have been registered under the provisions of the *Medical Act, 1915*, as duly qualified medical practitioners:

KEIPERT, LESLIE JAMES, M.B., B.S., 1918 (Univ. Adelaide), Stawell.

VAN SOMEREN, BERTRAM, M.B., 1915, M.S., 1916 (Univ. Sydney), Bright.

WILBE, ERNEST EDWARD, L.S.A., Lond., 1907; D.T.M., Liverpool, 1913, Manangatang.

Names of deceased practitioners removed from the Register:

ERSON, EDWARD GEORGE LEGER.
WALSH, GERALD.

Change of name:

LYLE, MARY RANKEN, to HERRING, MARY RANKEN.

Books Received.

AIDS TO ORGANOTHERAPY, by Ivo Geikie Cobb, M.D., M.R.C.S., 1922. London: Baillière, Tindall & Cox; Fscp. 8vo., pp. 183. Price: 5s. net.

CARDIAC ARRHYTHMIA AND THE NEOCARDIOLOGY, by Alfred Webster, M.D.; 1922. London: Watts & Company; Demy 4to., pp. 195, with 608 cardiograms. Price: 25s. net.

Medical Appointments.

DR. R. T. PATON, C.M.G. (B.M.A.), has been appointed a member of the Board of Health, New South Wales.

* * * * *

DR. W. K. W. FLOOK (B.M.A.) and DR. A. F. MACHIN (B.M.A.) have been appointed on probation as Medical Officers, Medical Branch, Department of Public Instruction, New South Wales.

Medical Appointments Vacant, etc.

FOR announcements of medical appointments vacant, assistants, *locum tenentes* sought, etc., see "Advertiser," page xviii.

ROYAL ALEXANDRA HOSPITAL FOR CHILDREN, SYDNEY: Honorary Physician.

ROYAL NORTH SHORE HOSPITAL OF SYDNEY: Honorary Assistant Anæsthetist.

SYDNEY HOSPITAL: Honorary Assistant Aural Surgeon.

Medical Appointments: Important Notice.

MEDICAL practitioners are requested not to apply for any appointment referred to in the following table, without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, 429, Strand, London, W.C.

BRANCH.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 30 - 34, Elizabeth Street, Sydney	Australian Natives' Association Ashfield and District Friendly Societies' Dispensary Balmain United Friendly Societies' Dispensary Friendly Societies Lodges at Casino Leichhardt and Petersham Dispensary Manchester Unity Oddfellows' Medical Institute, Elizabeth Street, Sydney Marrickville United Friendly Societies' Dispensary North Sydney United Friendly Societies People's Prudential Benefit Society Phœnix Mutual Provident Society
VICTORIA: Honorary Secretary, Medical Society Hall, East Melbourne	All Institutes or Medical Dispensaries Australian Prudential Association Proprietary, Limited Manchester Unity Independent Order of Oddfellows Mutual National Provident Club National Provident Association
QUEENSLAND: Honorary Secretary, B.M.A. Building, Adelaide Street, Brisbane	Brisbane United Friendly Society Institute Hampden District Hospital, Kuridala, North Queensland Stannary Hills Hospital
SOUTH AUSTRALIA: Honorary Secretary, 12, North Terrace, Adelaide	Contract Practice Appointments at Renmark Contract Practice Appointments in South Australia
WESTERN AUSTRALIA: Honorary Secretary, Saint George's Terrace, Perth	All Contract Practice Appointments in Western Australia
NEW ZEALAND (WELLINGTON DIVISION): Honorary Secretary, Wellington	Friendly Society Lodges, Wellington, New Zealand

Diary for the Month.

JULY 4.—New South Wales Branch, B.M.A.: Council (Quarterly).
JULY 5.—Victorian Branch, B.M.A.: Branch.
JULY 7.—Queensland Branch, B.M.A.: Branch.
JULY 11.—New South Wales Branch, B.M.A.: Ethics Committee.
JULY 12.—Western Australian Branch, B.M.A.: Council.
JULY 12.—Melbourne Pædiatric Society.
JULY 13.—Victorian Branch, B.M.A.: Council.
JULY 14.—New South Wales Branch, B.M.A.: Clinical Meeting.
JULY 14.—Queensland Branch, B.M.A.: Council.
JULY 14.—South Australian Branch, B.M.A.: Council.
JULY 15.—Northern Suburbs Medical Association, New South Wales.
JULY 18.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
JULY 19.—Federal Committee of the B.M.A. in Australia.
JULY 19.—Western Australian Branch, B.M.A.: Branch.
JULY 21.—Western Medical Association, Dubbo, New South Wales.

Editorial Notices.

MANUSCRIPTS forwarded the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

All communications should be addressed to "The Editor," THE MEDICAL JOURNAL OF AUSTRALIA, B.M.A. Building, 30-34, Elizabeth Street, Sydney. (Telephone: B. 4635.)

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